

A Guide to

DISASTER PLANNING AND MANAGEMENT OF HEALTH SERVICES

Edited by :

Dr. Ashok Sahni

Professor and
Hony. Executive Director

1992



INDIAN SOCIETY OF HEALTH ADMINISTRATORS (ISHA)

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INTRODUCTION

Disasters of all types - natural and man-made have been experienced in all countries and have had a serious effect on mankind. However, the development of technology and management sciences have enabled the mankind to the better prepared and initiative control programmes to minimize the effects and losses.

Compared with Asian countries, particularly neighbouring countries, far greater number of disasters take place in India and the loss - human, material psychological, is far greater.

District Medical and Health Services authorities are the key institutions in planning and management of health services, including disasters. World Health Organization has taken initiative in the last decade to provide technical information and professional expertise in planning and management of disaster programmes so as to promote effective health services.

This background material has been prepared for professionals and administrators at various levels to understand the scientific, programming and management aspects of disasters and health development.

DISASTERS: WHAT ARE THE NEEDS? HOW CAN THEY BE ASSESSED?

Michel Tailhades*
Michel J Toole**

INTRODUCTION

A disaster overwhelms the community's capacity to cope leading to excess morbidity and/or mortality. Through the study of past disasters we now understand more of the major effects of different types of disaster on people. Thus, much can be done at international, national, and community levels both to prevent and reduce the adverse consequences of disasters on health. This paper will concentrate on the needs at the local level during the various stages in the evolution of a disaster and examine methods of systematically assessing those needs at each stage.

A disaster results from one or more primary causes (or hazards), such as an earthquake, heavy rainfall, hurricane, chemical accident, drought, or armed conflict. Some hazards (eg. earthquakes and hurricanes) kill and injure many people at the time of impact. Often, however, the greatest toll on human kind is due to secondary effects such as flooding, fires, famine, and a multitude of refugees. Many kinds of disaster have compounding effects on each other, for example, in East Pakistan in late 1971, a cyclone led to a storm surge which swept inland causing extensive flooding. The flooding and the initial chaos of the relief programme were two of the events which triggered momentous political changes, a civil war, the creation of a new nation, and subsequent massive numbers of refugees. In general, the primary causes of disasters are not preventable (with the exception of chemical and nuclear accidents and-in theory-war). Their secondary effects, however, are amenable to prevention or at least mitigation.

The needs of a disaster-affected community depend largely on the following factors:

- (1) the type of disaster;
- (2) the resources of the community;
- (3) its degree of preparedness; and
- (4) the stage in the disaster's evolution

Disasters have been schematically divided into two broad groups, although there is considerable overlap:

- (1) Sudden-onset disasters, such as earthquakes, chemical or nuclear accidents, communicable disease epidemics, and hurricanes, as well as their secondary effects, such as fires or floods.

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(2) Gradual-onset disasters, such as drought, a plague of locusts, and civil conflict, with their secondary effects of famine and refugees.

Within these two groups, the preponderance of natural and human causes varies from highly natural (such as hurricanes), to highly man-made (such as civil conflicts). Nevertheless, there is an element of both natural and human causes in many disasters, particularly those which occur in certain developing countries, where civil strife and armed conflict have been common recently. Moreover, overgrazing, deforestation and certain agricultural practices have made things worse in drought-prone areas, thereby compounding the effects of periodic drought.

In general, the fewer resources which a community has, the more vulnerable it is to severe damage and loss of life following a disaster. This is most obvious in the case of an acute natural disaster, such as an earthquake: poor communities are severely affected because their housing is usually insubstantial. In addition, the level of preparedness directly governs how a community deals with the initial onslaught of a disaster. A well-prepared, informed community will already know what is needed and will be able to provide crucial information and implement essential relief programmes.

Phases of a disaster

- * Pre-disaster Phase
- * Alert phase
- * Impact phase
- * Post-impact phase (which includes secondary effects)
- * Reconstruction and rehabilitation phase

Pre-disaster Phase

Before a disaster a community has to assess risks, train its people to be prepared and plan programmes to prevent a disaster-if possible. It can do these itself but external help is very desirable. Risks have to be assessed for a nation, a for its various communities because risks vary geographically so that efforts must be focused correctly, as for example the risk of an earthquake along a known geological fault line. The assessment of risks related to gradual-onset disasters, however, is more complex, and is often constrained by political, economic, and social factors, particularly when the underlying cause is civil conflict.

Risk Assessment: This assessment should be done in the community where the disaster may strike. The aim is to make people both aware of the nature of particular local risks and ready to respond promptly to a specific disaster in their area. It is meant to demonstrate clearly those risk factors that need to be addressed in order to prevent or mitigate the effects of the disaster. For the purpose of this discussion we will take an example of each type of disaster; sudden onset (earthquake) and gradual onset (drought).

Sudden onset disasters Assessment in a community prone to earthquake must consider both the risk factors which increase deaths; and the resources necessary for relief, for example:

- buildings type of construction, nature and quality of building materials, strength of doorways.
- water nature of water supplies, degree of protection from damage, location of alternative supplies.
- communication systems in place, vulnerability to damage.
- industry site of industrial plants and presence of dangerous chemicals or gases
- transport location of roads and bridges subject to damage and alternatives to main routes.
- secondary targets potential targets of secondary effects such as fires and explosions.
- health facilities vulnerability to damage.

After this assessment is complete, the community should have a map identifying the major risks of an earthquake. Although rich and poor communities may share the same kinds of risks, poor communities often lack the resources to mount preparedness and prevention programmes. Community assessment, therefore, is only meaningful if resources are committed by the central government for follow-up, without resources it fails.

Gradual-onset disasters: Drought usually affects very poor communities whose ability to survive is marginal at the best of times, therefore the assessment of risk demands an early warning system (EWS) within the community. This needs to be part of a national EWS which employs well-defined risk factors, or indicators, to alert communities and government authorities at every level to an evolving crisis. Much baseline information is needed for the assessment of the community, such as rainfall patterns, farming practices, major food crops, availability of seed, food reserves and storage capacity, alternative employment possibilities, seasonal migration patterns, routine childhood growth monitoring data, groundwater sources, local marketing and cooperative structures, and existing development programmes. The ways by which the people have learned to cope must be examined and evaluated objectively for their effectiveness. Such long-standing strategies should not be ignored or hastily abandoned.

Training : When you have completed the assessment of risks, establish community education programmes. Stress local self-reliance; for example, the formation of cooperative food stores and selection of volunteer first-aid workers. Strategic plans in the community should also include plans for what not to do; for example, typhoid vaccination of the community is not

indicated immediately after an earthquake. The excellent film *Myths and Realities of Natural Disasters*, produced by the Pan American Health Organisation, contains many examples of what not to do after a natural disaster.

Sudden-onset disasters: In training the community to prepare for earthquake, develop the skills listed below so that they can reduce the casualties after the initial impact.

- * Effective personal protection from falling debris, especially in schools, hospitals, and other public buildings.
- * Prompt rescue of the wounded, whenever possible, without waiting for the arrival of external assistance.
- * Triage of the wounded and transport to designated hospitals.
- * Resuscitation and first aid for injured victims.
- * Prepositioning of relief supplies needed in the post-impact phase, such as surgical equipment, essential medicines, blanket, tents.
- * Establishment of temporary water supplies.
- * Allocation of responsibilities for different relief activities to avoid unnecessary chaos.

A rehearsal of what the community would do would help training and it must include housewives, the elderly, school-children, public safety officials, health personnel, factory workers and others.

Gradual-onset disasters: The training of drought-prone communities should stress food security and the interruption of the sequence of events which leads from drought to famine. Possible interventions are listed in the next section. Train local health workers so that they can evaluate childhood malnutrition, recognize micronutrient deficiency diseases, collect other morbidity and mortality surveillance data, and communicate information to regional or central health authorities.

Prevention: Sudden-onset disasters-earthquake - Better housing in high-risk areas is the best method. For instance, it was shown in Guatemala that adobe houses were more likely to collapse during an earthquake than cement houses. But poor people cannot afford safer homes unless they are given extra resources to improve their homes through, for example, low-interest loans.

Local health teams - training in triage and primary care of traumatic injuries.

Other measures include:

- * Multistorey buildings - inspected during building to follow anti-seismic principles and building regulations.
- * Hazardous chemicals - protected in industrial plant.

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- * Dams - reinforced in places where landslides might occur.
 - * Fires-proper fire-fighting equipment and training of local fire-fighters.
 - * Services - planning to restore communication and water supplies.

Gradual-onset disasters : These are more complex: so many factors are interdependent particularly in famine. Drought-resistant strains of food crops, soil conservation measures, reforestation projects, cooperative marketing and food storage, water conservation, and alternative income-generating activities are all relevant.

Prevention of famine must also recognize regional variations. For example, food supplies may occur in one region of a country during a year when many other communities are affected by drought; thus, internal purchase with redistribution was recently shown to be effective in Ethiopia. A national preparedness plan is essential, because local initiatives are not enough, and may demand changes in agricultural and pricing policies, the creation of regional food stores, land reform, and a source of credit to rural farmers. Do not underestimate the political difficulties.

Alert Phase

Sudden-onset disasters: The alert phase refers to the period when a disaster is developing and when it has not yet hit the community. The duration of the alert phase varies according to the type of disaster; for example, it is nonexistent for earthquakes, short-but crucial-for hurricanes, and quite long for drought and famine. If you act appropriately during this phase the effects of the disaster will be lessened and lives will be saved. For example, the simple evacuation of communities in Mexico from the path of Hurricane Gilbert in 1988 prevented many deaths and injuries, although it did not prevent severe damage from the effects of flooding which followed.

Gradual-onset disasters: In drought or famine emergencies, the actions to be taken during the alert phase depend somewhat on the accuracy on the EWS and whether the authorities are willing to respond promptly to information from the field. The aim during this phase is to ensure that food is available, that people are able to buy or get what they need, and to prevent many migrating and becoming refugees.

In risk-prone communities, early indicators of an evolving food emergency are:

- | | |
|---------------------------------|--|
| * decreased rainfall | * migration by adult men to seek employment. |
| * low acreage under cultivation | |
| * flooding | * strong black market |
| * low food reserves | * insect infestation |

Intermediate indicators are:

- * Crop failures
- * increased price of staples
- * increase in ratio of staple food price to daily wage
- * increased lending rates
- * sale or consumption of livestock
- * increased seed cost
- * consumption of seed grain
- * sale of land or valuables, such as jewellery
- * migration of whole families

The 'late' indicators of famine (the avoidable end-result of drought) such as increased child malnutrition rates, should not be relied upon to trigger preventive actions. Once malnutrition rates increase then the disaster is no longer in the alert phase, therefore it is now necessary to: release food reserves, move food from other regions with crop surpluses, provide employment to provide income to purchase food, and use alternative food supplies (eg. drought-resistant varieties of staple grains). There are few communities that are sufficiently self-reliant to do all this, therefore the nation must coordinate disaster preparedness and prevention.

The community has to collect data and communicate them to the appropriate authorities before and during the alert phase. When preventive measures have begun, their success depends on the community. The people may panic and want to pack up and move, so they must be kept informed through efficient communication. Make sure that your health workers strengthen their surveillance system at this stage and ensure that acute malnutrition, morbidity, and mortality rates are communicated regularly to the designated regional office

Impact Phase

The needs of communities during this phase depend largely on the characteristics of the disaster and the degree of preparedness. There is no well-defined impact phase for gradual-onset disasters, and sudden-onset disasters, and sudden-onset disasters are unpredictable in every way. Earthquakes, for example, are unpredictable and highly lethal, have narrow geographic focus, and are sudden. By contrast, hurricanes and cyclones are usually more predictable and affect a wider area; among acute natural disasters, the ratio of deaths to affected population after hurricanes is second only to earthquakes. In general, floods are more moderate in every way.

Most deaths in earthquakes are due to crushing injuries, affect young children and the elderly, occur immediately or soon after the impact, and often occur when doorways collapse and obstruct escape from buildings. Additional deaths are due to burns from fires that sometimes break out soon after the initial impact. While some deaths in hurricanes are due to direct trauma from flying debris, most occur due to drowning in the floods which often follow. Epidemics of communicable diseases are rare after natural disasters and occur only if

survivors are placed in crowded, unsanitary camps or if serious water shortages persist for extended periods.

The priorities of a relief effort after an acute natural disaster should reflect these realities; the immediate response should not await a detailed assessment of impact. During this period, when outside resources have not yet arrived, the effectiveness of the relief effort will depend entirely on local efforts, and this depends on how adequately the community is prepared. The priority needs after an earthquake, for example, are the following:

- * rapid assessment of the extent of damage and injuries.
- * establishment of medical triage centres
- * search-and-rescue operations for trapped victims
- * appropriate surgical treatment of injured survivors
- * re-establishment of communications.

Rapid assessment: The rapid assessment after an acute natural disaster needs to be done immediately (within 24-48 hours).

The purpose of the assessment is:

- * to assess the magnitude of the disaster and its immediate health consequences.
- * to assess the immediate impact on health services.
- * to estimate the extent of damage to other health-related services.
- * to assess the adequacy of local resources to mount an adequate relief operation.

Assessing impact on health :

This assessment will be aided by access to baseline demographic and health data collected before the disaster. New data are now needed on: number of injured, types of injuries, secondary injuries in the post-impact phase, age and sex-specific death rates, main causes of deaths, and risk factors of death.

Other health-related information includes:

- * state of water and power supplies
- * functioning communications
- * injuries and deaths of health personnel
- * number, location and type of functioning health facilities
- * current treatment capacity of health facilities
- * location and quantity of essential medical and surgical supplies.
- * nature and quantity of key emergency supplies needed from outside
- * sources of appropriate food supplies
- * quality and quantity of untreated water supplies.
- * status of sewage treatment and disposal system.

An important and frequent source of error made in early rapid assessments is to focus only on the areas which are thought to be most affected, such as villages are easily forgotten during the initial response to the disaster. During the following few days, the needs for emergency relief of less accessible areas, shortages in primary health care resources needs for secondary health care, shelter, food and water must all be assessed. The affected communities and the national government should determine both the need for and nature of any national and international assistance. Donors should wait until what is really needed has been assessed: in the past much relief has been inappropriate.

Post-impact Phase

Sudden-onset disasters: This phase may vary between a few days and several months following the initial impact. While the community may have to cope alone with the immediate response, later relief efforts are usually assisted by outsiders, both national and international. In general, most deaths occur during or soon after the initial impact:

Do the following in this phase

- * evacuate survivors to safe areas and provide shelter to the homeless
- * provide adequate food and clean water supplies
- * continue triage and referral of the injured to appropriate facilities
- * continue mortality and morbidity surveillance
- * re-establish primary health care services.
- * establish measles vaccination, where affected persons have been crowded into relief camps (other vaccines, such as Cholera and typhoid fever are not indicated)
- * provide basic PHC services, such as oral rehydration therapy
- * establish nutritional surveillance if food supplies have been disrupted.

Gradual-onset disasters: There is no clear line between the initial impact and post-impact phases of slow-onset disasters. In a drought (if mitigation efforts fail) the prevalence of malnutrition increases, mortality rates rise and people move to other parts of the country or into neighbouring countries. In an established famine, relief should be directed at avoiding deaths due to malnutrition and to communicable diseases that are linked to malnutrition, such as measles, diarrhoea, and acute respiratory infections through an effective system of primary health care.

Rapid assessment of health and nutrition: The assessment of needs in famine-affected areas is often complicated by other factors which may have helped precipitate the crisis, such as war: it may be very difficult to reach the affected population. When access is possible the following information is useful:

Demographic characteristics

- * total population (the denominator for estimating mortality, malnutrition, morbidity rates and total relief needs)
- * breakdown of population by age and sex (to allow for targeting of specific programmes, eg. immunization of children, supplementary feeding for pregnant women).
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Background health information:

- * baseline malnutrition, morbidity, and mortality rates before the food emergency or population displacement.
- * established health care services
- * PHC programmes in place before the emergency, including, for example, immunization coverage rates.

Nutritional status:

- * evaluate nutrition and thus identify at-risk groups within the community to provide baseline data for any later evaluation of the effectiveness of relief programmes.
- * carry out standardized random sample surveys (usually employing cluster sampling techniques) if follow-up comparisons are planned.
- * weight-for-height is the preferred measurement of acute malnutrition; however, in many cases, a rapid assessment may be done by measuring the mid-upper arm circumference on small convenience samples of children aged 1 to 5 years.

In addition, a rapid assessment of a drought-affected population should assess the adequacy of existing general, supplementary, and therapeutic feeding programmes already in place. As a general rule, if all other famine prevention strategies (such as internal food purchase and employment programmes) have failed, emergency feeding should be provided to affected communities to prevent migration to camps where overcrowding and poor sanitation are often associated with a high incidence of communicable diseases and raised death rates. The following should also be assessed:

- * type of health facilities available for the affected population.
- * adequacy of trained health personnel
- * availability of essential medical supplies, such as oral rehydration salts.
- * access to vaccines and immunization equipment.

Essential relief: The essential elements of a relief programme for totally-dependent, famine-affected populations are as follows:

- * adequate food rations (containing at least 1900 kilocalories of energy per person per day and micronutrients such as vitamins A,B,C and iron)
- * access to clean water supplies.
- * measles immunization and vitamin A supplementation for all children aged between 6 months and 5 years.
- * prompt management of dehydrated children with oral rehydration fluid.
- * supplementary feeding for vulnerable groups (malnourished children, pregnant and lactating women, the sick and the elderly)
- * a basic health information system.

Reconstruction and Rehabilitation Phase

This is a long-term phase. It aims at getting the community back to where it was before the emergency and to strengthen its ability to prevent and/or mitigate further disasters. While a programme of rehabilitation after acute, natural disasters might stress reconstruction more than that following slow onset disasters, both must train and educate the community. Rehabilitation after food-related emergencies means to increasing food security, diversifying food production and income generation, and in many instances demands profound changes in land and resource distribution. The details of this rehabilitation phase are beyond the scope of this paper.

CONCLUSIONS

The role of the community in the prevention of and response to disasters has long been overlooked. In many disasters, especially those sudden in onset, most rescues are performed by the local community. For example, more than 90% of trapped survivors of the Armenian earthquake of 1988 were rescued by local teams during the first two days, well before external assistance arrived. Although the characteristics of sudden onset and gradual-onset disasters are quite different, in both the community must identify risks, get properly prepared (including prevention) and provide the initial assessment and response - after a disaster strikes.

District medical officers, especially in more remote areas must understand the basic principles of disaster preparedness and response. Rural health programmes should routinely incorporate disaster preparedness and training in their activities. Likewise, other rural and urban development authorities should ensure that their projects address the potential impact of disasters common to the region.

If community-level efforts are to be successful, national governments, international agencies, bilateral donors, and non-governmental organizations need to provide appropriate support. Early warning systems require national and international cooperation and information exchange, and a commitment to respond to key indicators. If disaster relief programmes are going to address real needs, then donor governments and agencies need both to be patient and to respond to requests based on objective assessments. Internationally funded development programmes should be designed so that they do not contribute to environmental degradation and thereby increase the risks of natural disasters. Finally, regional cooperative projects, such as the stock-piling of food reserves, might contribute to a more prompt and effective response to disasters.

This note describes what is disaster ? Types of disaster ? what should be a disaster plan; and what are the problems in the management of disaster in hospitals ?

1. DISASTERS IN HOSPITALS

Hospital is an organization which provides relief and care for sickness and disease. The image of a hospital is based on efficiency and effectiveness of two types of services, viz., (a) emergency services, and (b) out-patient services. In every locality, large or small, urban or rural, there are likely to be emergencies. The society would like to have facilities for meeting the emergencies to save the life of an individual or group of individuals during emergencies. It is necessary that the emergency or casualty services should function well. Disaster management is an extension of emergency or casualty services. In USA, accreditation demands a written disaster plan and two drills each year.

Disasters can occur any time, any place, in any weather. In U.K. according to Rutherford (1973) two incidences of disaster can be expected each year. In India, we have examples of many major disasters - - Bhopal Gas Tragedy; Kaniskha (Air India); Delhi riots during the time of Smt. Indira Gandhi's death; Operation Blue Star; train accident at Byculla, Bombay; cyclones in Andhra Pradesh; A-320 disaster at Bangalore in 1990; earthquakes in Uttara Kashi, Uttar Pradesh in 1991; K.K. Express on 30th October, 1991 and recent liquor tragedy near Delhi.

Disaster is a calamity or a sudden misfortune. According to Colin Grant (1973), disaster is a catastrophe causing injury and illness to 30 or more people. The normal system of a hospital or an organization cannot bear and there is disequilibrium of the hospital as a system.

2. CLASSIFICATION

Disasters can be classified as follows :-

- a. Natural Disorders - earthquakes, volcanic eruptions (beneath earth surface)
- b. Land slides, avalanches (at earth's surface)
- c. Windstorms (cyclones, typhoon, hurricane)
- d. Tornadoses, hailstorms, snowstorms, sea surges, floods, droughts (meteorological, hydrological phenomena)
- e. Biological phenomena; Locust swarms; Epidemics of diseases

- f. Man-made disorders - Conventional warfare, Nuclear, biological, and chemical warfare
- g. Caused by accidents - vehicular (plane, train, ship, bus, boat)
Drowning, collapse of building, explosions, fires, biological and chemical (including poisoning)

3. DISASTER PLAN

Keeping in view the increasing number of disasters in India and the need for the hospitals to be prepared for meeting the disastrous situation, an international workshop, sponsored by World Health Organization, was organized in 1986 at Nagpur. Many States were requested to develop disaster plans. Since then, the Government of India has urged State Governments to have State level and district level disaster plans for health services.

The Disaster Plan should have the following features :-

- a. Should be simple and understandable by all
- b. Flexible and fit different types of disorders
- c. Clear and concise - even in noise and confusion, hospital staff should be able to act upon it instantaneously
- d. Adaptable during all hours - day and night including holidays
- e. Extension of normal hospital working so that people can act upon it immediately in a routine manner.

4. PLAN - PARAMETERS

a. Distribution of Responsibilities

The hospital should develop action cards spelling out the responsibilities of persons and departments - administrators, medical officers, incharge of casualty, matrons, nursing officers, telephone operators, clerks, messengers and wardboys.

b. Chronological

Initial alert can be given by television, telephone, persons, wireless; the place and time of accident and the type of casualties should be clearly communicated.

Based on the above, the hospital disaster plan will be activated. The medical officers, hospital administrator, controller, the switchboard operators should notify the key personnel, particularly the department of radiology, operation

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theatre, blood bank, laboratory, medical stores, dietary, security, ambulances and the matrons. The nursing officer should make all arrangements in the wards for receiving the casualties.

Maximal number of staff in the above departments should be available and on duty within ten minutes of the call. The coordination and control for disaster management should be as follows :-

The medical superintendent/director would be responsible for determining the priority for treatment and evacuation/distribution. He would instruct the medical officers and make adequate OT arrangements. The nursing officer would be responsible for allocation of nursing and paramedical staff, deployment of staff and recall of staff from homes and hostels. The administrator would be responsible to deal with the relatives, friends, public relations, fire brigades, police and handling as well as utilization of voluntary workers. The clinical and OT departments would be responsible for clinical, investigative and therapeutic activities.

5. PROBLEMS IN DISASTER MANAGEMENT

a. Clinical

Lack of professional staff, investigative facilities, drugs; facilities for contaminated casualties, decontamination, isolation, protective clothing availability and usage by the clinical staff.

b. Administrative

Documentation of the injured - consciousness, unconsciousness, classification, nature of treatment given, documentation for police, communication to various bodies, telephone, telex, fax and other facilities, communication to friends and relatives, counselling and support to the relatives and friends, control of the crowd, voluntary workers, protection of patients' property, nature of information to be provided to the Press and Broadcasting services, disposal of the dead, post-mortems and protection of bodies of VVIPs, mortuary facilities.

6. ACTION PLANS

It has been suggested that every hospital from 30-bedded and above, public or private, should have good casualty services. The district level hospitals should have the disaster plan and facilities. Each hospital should have 2-3 mini-drills each year.

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DISASTER MANAGEMENT

The Disaster Profile of India - A Report

Dr B K Verma

Director (EMR)

INTRODUCTION

India is a vast country extending from 8° North to 37° North that is a distance of 3214 Kms from North to South and from 62° East to 97° East longitude, that is 2933 Kms East to West with total area of 32, 87, 782 Sq.kms. It is the seventh largest country in the world in terms of area and with a population of more than 700 million people, it is the second largest country in the world in terms of population. The monsoon influences our climatic conditions so tremendously, that the climate can predominantly be described as the Tropical monsoon type. India is one of the monsoon countries of Asia and has the same climatic pattern as is found in most of the countries of South-East Asia.

With such a vast area and a huge population, it is hardly surprising that the potential for different natural calamities such as floods, drought, cyclones, land-slides, tidal waves and severe heat and cold waves exist and whenever any of these calamities strike this country, it affects a large chunk of the human population.

TYPES OF DISASTER IN INDIA :

Because of the wide variation in Geographical and climatic conditions, different parts of the country are prey to different types of natural calamities. In order to assess the disaster potential of this country, we can roughly divide India into five zones :

1. Northern Mountain Region :

The lofty Himalayan mountains and their foot hills are often prey to strong snow storms leading to land slides and strong cold waves, endangering human and animal life.

2. Indo-Gangetic Plains :

This part of the country contains some of the oldest and largest river systems of the country. The melting of snow from the Himalayas, and rainfall during the monsoon can lead to floods in the various rivers and their tributaries, bringing havoc to the millions of people who have made their homes on the banks of these rivers.

3. Deccan Plateau :

This part of the country does not contain snow fed rivers as the North does. Whenever there is a shortage of rainfall

during monsoon, this area faces drought.

4. The Western Desert :

The state of Rajasthan and part of Gujarat lie in the desert area. The rainfall in the great Indian desert known as "Thar Desert" is scanty and unreliable. The people living in this area often face the problem of drought which culminate in an acute drinking water shortage. The Rajasthan canal, being constructed by the Govt. aims to alleviate these problems.

5. Coastal Areas :

In all the seven States which share the sea-front, that is Gujarat, Maharashtra, Kerala, Tamil Nadu, Orissa, Andhra Pradesh and West Bengal, there is problem of sea erosion, cyclones and tidal waves.

Besides this, the entire Northern part of the Indian Sub-continent from Hindu Kush to Eastern Himalayas lie in the earthquake-prone belt of violent sub-terranean volcanic activities. However, variations do occur, and it is highly probable that the very state which had experienced floods at one time of the year may face drought at another period of the same year.

EXISTING PLANS :

The Govt. of India has devised various plans and launched several programmes to deal with different types of disaster situations which, in brief, are as follows :

1. Flood Control :

After the extremely severe floods experienced in 1954, it was considered that efforts in the field of flood control need to be intensified on the basis of a well-planned programme. Accordingly, the National Flood Control Programme was launched in 1954. The Programme was divided into 3 phases: Immediate, Short-term and Long term.

The immediate phase was devoted to intensive collection of data and execution of emergent flood protection measures. The short-term programme which was roughly to coincide with the Second Five Year Plan, envisaged the construction of embankment protection of some towns, villages etc. The longterm phase envisaged construction of storage reservoirs, stabilising the benefits of works already carried out, as well as taking up of additional works of embankments, river drainage etc.

FLOOD - CONTROL BODIES :

At the State level, a technical advisory committee examines the proposals, approved by State Flood Control Boards, which also lay down policies at the State level. At the National/

Central level, major schemes are examined in detail by the Central Water Commission and the Ganga Flood Control Commission. The Central Flood Control Board formulates policies at the national level. Appreciating the magnitude and complexity of the flood problem in the Brahmaputra Valley in North-East, the Brahmaputra Board was set up by the Government in 1981.

A commission called the Rashtriya Barh Aayog was constituted by the Government in July 1976, and it submitted its report in March 1980. On the basis of this report, the Government prepared the guidelines and instructions for implementation by the State Governments and concerned departments of Central Government in September 1981.

PROGRESS :

Since the commencement of the National Flood Control programme in 1954, construction of 12,265 Km. of embankments, 12,809 Km. of drainage channels and 304 town protection schemes and raising the level of 4700 villages has been completed at a cost of 1,137,97 crores affording reasonable protection to an area of nearly 1157 lac hectares. In addition, a number of reservoir projects have been completed, which have helped to mitigate the flood problem in the river channels down-stream. Notable among these are Hirakud Dam on the Mahanadi, Kanau, Maitbou, Punchot and Tilaiya dams on Damodar, Bhakra on Sutlej; Pongono on Beas and Ukai on Topi. The Central Govt. has also set up a Flood Forecasting Organisation to issue advance notice about impending floods so as to alert the agencies concerned with rescue and relief operations to organise themselves and also to put into action the flood-fighting and maintenance organisations to gear up to the emergency.

SEA EROSION :

In all the seven States which share the sea front, the problem of sea erosion exists in various degrees. It is of a serious nature in a stretch of 560 km. coast-line in Kerala, protection measures have been taken since the first Five - Year Plan.

CYCLONES :

The Cyclone Distress Mitigation Committee has brought out comprehensive codes in respect of Andhra Pradesh, Orissa and West Bengal which are prone to the onslaught of cyclones. The Govt. of Tamil Nadu has prepared a model action plan for the purpose. The government has its own contingency plans for emergency operations. The measures taken to mitigate the damages and sufferings from cyclones comprise of (a) warning service (b) proper machinery for evacuation of people to suitable shelters and shifting of moveable property; (c) community preparedness at all levels.

The India Meteorological Deptt. (IMD) has already set up a fairly effective organisation for the detection and tracing of cyclonic storms. India consists of the following Centres : Calcutta, Bhubaneshwar, Vishakhapatnam, Madras and Bombay.

The main components of the observation system for the detection and early warning for tropical cyclones are the following :

- (a) Cyclone warning radars located at Calcutta, Paradeep, Vishakhapatnam, Madras, Karaikal, Bombay and Goa.
- (b) Satellite Imagery : Facilities for receiving cloud imagery have been provided at all cyclone warning centres.
- (c) Special observatories : In addition to a departmental network 31 special observatories for recording standard surface meteorological variables during cyclone period have been set up along the east coast of India. Cyclone warnings are communicated to all important officials in the coastal states by high priority **land line telegrams under a two-stage warning system** issued at least 48 hours and 24 hours before the onset of adverse weather.

For ships out at seas as well as those operating coastal waters, warning against cyclones are issued six times a day through coastal postal and telegraphic radio stations.

DROUGHT

In regard to drought, three expert groups have been set up by the Deptt. of Agriculture and cooperation. These include the Crop-weather Watch Group, the Technology Transfer Group and the Monitoring and Coordination Group. The weather watch and technology transfer render appropriate advice depending on the dynamics of weather conditions.

Thanks to the achievement of self-sufficiency in food grains in the recent years and building up of a comfortable buffer stock, the country is now in a better position to meet the requirement of food grains in drought affected areas. For protecting farm animals during drought, animal camps are organised around a source of water.

THE CONSTITUTION OF IMD :

The India Meteorological Deptt. (IMD), issues warnings against heavy rainfall, strong winds and cyclonic weather for the general public as well as for a number of private and public organisations.

Flood Meteorological Offices have been set up at Ahmedabad, Bhubaneshwar, Guwahati, Lucknow, Jalpaiguri, Patna, Hyderabad and Asansol to provide Meteorological support to the flood forecasting organisation of the Central Water Commission.

Cyclone warnings to ports and ships are issued by the¹² offices of the IMD in Visakhapatnam, Bhubaneswar and Madras.

LEGISLATION OR REGULATIONS AND COORDINATING BODIES :

The country has been divided into 31 States and UTs. Each State has its own guidelines and policy to tackle the situation based upon the general broad guidelines issued by the Govt. (Min. of Agriculture). Some States have a relief code containing laws on the subject. The states for administrative control have been further divided into districts, taluquas, subdivisions and blocks.

For tackling any disaster, the state Govt. has a full fledged secretariat wing under a Relief Commissioner/Secretary for proper coordination at District level. In case of need, the State Govt. can ask the Centre for assistance by way of Financies or manpower and material. At the Centre, the Ministry of Agriculture is the nodal Ministry for coordinating all activities during any natural calamity.

Health is an important part of disaster management. Hence, in the Ministry of Health and Directorate General of Health Services, there is a separate wing called the Emergency Medical Relief Wing which coordinates all activities relating to health.

ACTION DURING NATURAL CALAMITIES:

As soon as any part of a district is affected by natural calamity, the Distt. Collector forms a small Committee at the District level to assess the degree of devastation and also how to do the rescue and relief work. After going into action, they inform the State Govt. Relief Secretary/Commissioner who is directly under the Chief Secretary or the Chief Minister. Senior Govt. officials and the ministers are deputed to stay in the affected area to oversee relief operations.

During the disaster, usually the Central Ministers, including the Prime Minister and the Finance Minister visit the area and release funds so that finances do not come in the way of tackling the situation.

Subsequently, the Central Team, in which the Health Minister is also included, visit the States to assess the magnitude of the problem and recommend financial assistance from the Centre.

HEALTH

The whole planning of health is divided into the following heads :

1. Community Disaster Preparedness.
2. Anti-disaster planning.
3. Disaster Mitigation.
4. Rehabilitation.

Community Disaster Preparedness :

Mass education is provided by mass media like radio, T.V. and Documentary films to educate the people regarding necessity of safe portable drinking water and how to make the water safe and drinkable, and also the correct use of latrines, urinals and cooking habits etc.

Community Disaster Planning :

Community disaster planning means the contingency planning necessary for the management of disaster situation from the time of initial warning to the final period of reconstruction. The main factors are :

- i. Medical and paramedical manpower.
- ii. Requirement of the manpower depends upon the intensity of the disaster. However, a tentative plan and requirement of medical and paramedical persons are calculated in advance in prone areas. Necessary deployment plans are also chalked out by District offices of Health.
- iii. Stock piling of essential medicines and medical stores.
- iv. Evacuation to higher places.

Usually, the District Collector has plans for evacuation or selects upper areas in which he always engages his District officials including DMOH. The DMOH provides immediate medical care at the disaster site and at the camp site by deploying medical and paramedical staff in tents or other temporary structures. He also keeps beds vacant in hospitals for emergencies.

Disaster Mitigation :

The immediate problem is to provide medical care at the site which is done by PHC or temporary centres created for the purpose. But the main problem is to prevent the outbreak of an epidemic, for which the following measures are taken :

1. Immunisation in endemic areas.
2. Random sampling of stools and blood by surveillance teams.
3. Disinfection of water sources.
4. Spraying of DDT and Malathion for checking Malaria spread.
5. Distribution of water purifying tablets and education for their use.
6. Arrangement for feed-back information from periphery to district regarding endemic situation and medical stores.
7. Anti-fly measures.
8. Environmental sanitation of evacuee camps and marooned villages.

1. CONCEPT OF DISASTER AND ITS MANAGEMENT

Definition

Disaster is defined as disruption of human ecology which cannot be absorbed by the adjustment capacity of affected community within its own resources.

Apparently, with the above definition in view, effects of disaster can be minimised by increasing the adjustment capacity of a community by way of training and contingency planning.

2. CLASSIFICATION OF DISASTERS:

Disaster have been classified in various ways. It may be classified according to mode of onset : Relevance of this classification is availability of time for preparedness. Disaster with sudden onset hardly gives any time for preparedness. Therefore, absence of predisaster planning may always lead to chaos & confusion in Relief- management.

(a) Disasters having sudden onset:

Floods, Earthquakes, cyclones, volcanoes, tornados, hurricanes fire, land slides, avalanches, tidal waves, chemical & nuclear disasters.

(b) Disasters having slow onset :

Drought, Internal strife and war. Disasters can also be classified on the basis of causative factors like natural or manmade.

Man-made disasters includes war, riot, rail or air disaster, mining accidents and technological disasters including chemical disasters. On the other hands natural disasters includes, floods, cyclones, drought etc.

3. STAGES OF DISASTER:

Events during any disaster take place in such quick succession that it may be difficult to identify each separately. But broadly these sequence of events can be divided into different stages.

(i) Inter-disaster stage :

This stage includes period between two disasters. In this period a contingency plan could be evolved and rehearsed from time to time. This is a quiet period in which planning could be done.

(ii) Pre-impact stage :

This is the period immediately before a disaster strikes in which some warning about the impending disasters is know to the local community. The cyclone warning or pre-flood warning are typical examples.

(iii) Disaster Phase :

This is the period in which the disaster strikes the community located in a particular area. This stage of disaster could be further classified into :-

(a) State of Isolation :

This is the period immediately after a disaster has struck, during which there is destruction of property/communication. Livestocks are affected whether human, animals or Agriculture. Help is not available even from one individual to other individuals of the same affected community. As a matter of fact there is complete isolation of each and every member of the community. This is the period when there is maximum morbidity and mortality.

(b) Stage of Rescue:

This is the phase of recovery from unexpected miseries where the affected communities try to group and start rescuing each other. There is still complete isolation. However, the community themselves organise rescue team and start evacuation of the affected population including animals from the trapped area. Available first-aid treatment is also provided.

(c) Stage of Relief :

This is the stage in which the relief starts coming from outside the affected area. Communication is established and there is well organised internal or external relief to the affected community. Usually, it takes 24-48 hours to provide such a relief.

(d) Phase of Temporary Shelter:

This is the stage in which camps are established where kitchen and other basic amenities are provided.

(iv) State of Rehabilitation :

This is the stage in which the affected community is either rehabilitated to the original or alternative site.

PRINCIPLES OF DISASTER PLANNING :

With the above information about disasters it is apparent that a programme of disaster management based on relief and rehabilitation cannot prevent morbidity and mortality, because maximum morbidity and mortality occur during the phase of isolation and rescue. During these two stages, a community is on their own, therefore, unless a community is prepared to face a disaster effectively, loss of lives and property is bound to be on the higher side.

The psychological trauma as a result of morbidity and

mortality in a family cannot be compensated by any relief and rehabilitation programme. However, effects of disaster could be minimised, if there is predisaster preparedness programme/ planning .

The pre-disaster planning available in the country by & large remains (in practice) on paper only. As a matter of fact, the disaster management programme starts and ends with relief and rehabilitation programmes.

Disaster management requires multi-departmental and multi-disciplinary approach in which close coordination at various levels are necessary.

Broadly the following actions are required state wise :

1. INTER-DISASTER STAGES :

This is the most important and crucial stage as far as management is concerned. This stage is actually the stage of planning. During this stage, the disaster plan is evolved and is constantly updated after each disaster. Here, the following action is required :

(i) The Vulnerability Analysis :

Each country/state / district is required to identify the most disaster prone zone in their area with the population and alternative side for evacuation.

(ii) Risk Assessment :

Demographic	
Geographic	Datas of the
Epidemiological	Vulnerable area

(iii) Mapping of Environmental Hazards

(iv) Contingency Planning :

(a) Selection of Alternatives

(b) Assessment of longistic facility

Transport
Communication
Stores
Manpower

(c) Medical Planning :

- For on-the-spot treatment-First Aid, Training to Community & orientation Programme.
- For quick transportation of injured people.
- Hospital contingency planning.

(v) Checking/Rehearsing of Contingency planning at regular intervals as part of community and Government preparedness.

(vi) Arrangement for Base-line Data/Analysis.

2. PRE-IMPACT STAGE :

This stage is actually meant to keep people in vulnerable areas in stage of alertness and to initiate measures to minimise effects of impending disasters like shifting to alternate place, storage of articles for immediate need, etc.

Predictability of disaster is an important part of disaster management. Equally important is to provide mechanism for effective and quick transmission of the warning system to the community.

3. REHABILITATION STAGE:

The following objectives are required to be achieved.

- Rehabilitation to original or alternative site with basic facilities like drinking water, shelter, food and sewage disposal system.
- Immediate post-disaster evaluation of difficulties noted in the management.

Disasters and Health Problems :

These problems could be due to either or any combination of factors enumerated below :

- Directly due to impact of disaster like drowning, during flood, multiple injuries during earthquake, thermal blast and radiation effects during nuclear disaster.
- Due to delay in havoc.
- Due to non or inadequate availability of immediate medical care (First-Aid).
- Due to disorganisation or non-availability of centres for advanced medical care.
- Due to delay in transportation to advanced medical centres.

FACTORS :

Factors responsible for Health hazards have been identified as follows :-

1. Population Density

Density of population increases approximation resulting in spread of diseases. As a matter of fact, sudden increase of population in such a situation makes existing services inadequate, resulting in delayed medical attention and over-loading of basic facilities like shelter, water supply, food supply and sewage system.

2. Population displacement

Causes introduction of new diseases either to migrant or local population.

3. Disruption of pre-existing facilities

Due to direct effect on water and power supply, sanitary facilities and health of the population.

4. Disruption of Normal Health Programme

Existing infrastructure by health programme may be directly affected and they may become inadequate.

5. Increased space for Vector Breeding

Due to inundation of areas during or after flood, cyclone and also the breakdown of normal sewage system, there is favourable condition for vector breeding.

6. Climatic Exposure

Due to pressure on shelter and also due to changed surrounding for living there is increased incidences of upper respiratory tract infections.

7. Inadequacy of Food & Nutrition

Usually there is no effect of short term disruption of food supply in normal individual, but border line cases of under nutrition & vulnerable population like children, aged person or pregnant women may show effects of inadequate food.

8. Psychological Manifestation

Due to loss of property and loss of lives of relatives, feeling of insecurity creeps in the minds of affected population like anxiety, neurosis and depression etc.

DISASTER EVENTS FROM 1960 TO 1989 IN FIVE COUNTRIES OF THE REGION

TYPE	FREQUENCY	KILLED	INJURED	AFFECTED
INDIA				
Accident	40	5512	101359	351010
Avalanche	1	250	0	0
Civil strife	2	5660	0	10400000
Cold wave	7	1555	0	0
Cyclone	26	31730	1700	33474172
Drought	9	0	0	710666000
Epidemic	19	16150	0	35723
Earthquake	8	595	2424	50000
Fire	7	60857	103059	754926905
Floods	38	24983	1000	223296610
Heat wave	7	1235	0	0
Storm	27	2647	1993	9672267
TOTAL	191	151179	211535	1742872687
BANGLADESH				
Accident	20	2826	1462	382
Civil strife	1	200000	0	17000000
Cyclone	32	397258	617175	26458753
Displaced population	1	6150	0	213879
Drought	3	0	0	5000000
Epidemic	10	606234	618637	48673014
Earthquake	1	2	100	0
Fire	1	32	0	2000
Floods	22	45953	100000	190867542
Landslide	1	200	0	0
Storm	19	43600	2795110	240000
TOTAL				
INDONESIA				
Accident	8	977	530	130
Cyclone	1	1	60	3000
Displaced population	1	0	0	400000
Drought	8	8657	0	3722220
Epidemic	11	573	0	535006
Earthquake	24	9359	5957	604432
Fire	1	0	0	36500
Floods	60	2019	2071	2266726
Landslide	6	412	0	10051
Tsunami	3	317	23	0
Typhoon	2	1652	123	0
Volcano	17	2884	3060	785083
TOTAL	142	26851	11824	8363148

Disaster Events (Contd...)

TYPE	FREQUENCY	KILLED	INJURED	AFFECTED
NEPAL				
Accident	1	100	0	0
Drought	4	0	0	4400000
Epidemic	2	1017	0	5024
Earthquake	3	889	6717	420000
Floods	10	1944	155	318500
Landslide	6	551	0	75000
Storm	1	70	0	0
THAILAND				
Accident	6	264	450	450
Civil Strife	1	0	0	200000
Displaced population	3	1	100	680500
Epidemic	1	100	0	2800
Fire	1	0	0	500
Floods	9	528	745	6520320
Landslide	1	437	0	0
Storm	1	55	0	0
Typhoon	3	769	0	43000

Health Action, Vol.4, April 1991, Catholic Hospital Association of India, pp. 28-29

DISASTER MANAGEMENT

Lessons from Bhopal

Three years ago, on the night of 2 December, 1984, one of the largest industrial disasters in history took place in Bhopal. Tonnes of MIC escaped into the atmosphere from the UCIL plant, causing over 3,000 deaths and leaving scores of thousands maimed for life.

What follows is an exercise in hindsight. We have undertaken this exercise to recapitulate what happened in December and January of 1984-1985 and to identify the shortcomings in our efforts. The intention is not to assign blame but to learn how we can handle disasters better in the future.

The suggestions that follow are based on an understanding of what is possible in countries like India, and on the belief that sharing of information leads to better management. At each stage we suggest only those measures possible at that stage assuming that the measures suggested at an earlier stage were not implemented. We have, for the purposes of this exercise, not raised questions about the present socio-technical paradigm or the development process. Therefore we have not raised the question whether chemical fertilizers are necessary at all. We also recognise that there is a strong nexus between industry, government and politicians in power, hence our repeated appeal to the people to agitate for their right to information. By 'people' we mean MPs, MLAs, voluntary agencies, trade unions and all citizens of Bhopal.

The authors welcome suggestions from readers about what more could have been done so that we can incorporate them into this exercise and come up with a better model of disaster management.

EVENTS BEFORE THE GAS LEAK

Event, 1969:

Proposal to set-up a pesticide plant in Bhopal submitted to the government of India.

What was done:

Proposed plant was located within a few hundred metres of officially approved and existing residential areas and industries, bus stand and railway station.

What should have been done:

Union Carbide should have been asked to give details of the hazardous products and processes involved in the plant. Since this information would have revealed the presence and use of large amounts of extremely hazardous chemicals like MIC and phosgene, the government should have then requested Union Carbide to submit details of other processes being used around the world to produce the same product, along with risk assessment analyses and "worst case scenarios" with respect to the running of these plants. Information on the latest methods being used for producing and storing similar products at different plants in the US and Europe, along with comparative safety analyses of the different plants and processes, should also have been requested.

This would have resulted in selecting a safer but similar pesticide or a safer process already being used in industrialised countries. Depending on the worst case scenario

analysis, the plant would have had to be located at an appropriately safe distance from built-up areas. Union Carbide should have been asked to submit details of research data on medical, biochemical and chemical properties of the hazardous chemicals, along with data on the methods of monitoring and analysis of the presence of such chemicals in the environment, flora and fauna, water, food and the human body. Permission should have been withheld until this exercise was completed.

Event, 1973-1975:

First drum of MIC brought to Bhopal for experimentation; UCIL receives license to produce Sevin (Carbaryl); FERA clearance given.

What was done:

Business as usual. No special efforts made to ensure safety of the surroundings or to set up systems for monitoring the working and safety procedures at the plant.

What should have been done:

By UCIL:

- UCIL should have submitted the worst case scenario for a disaster at the plant to the government authorities for information.

By Government:

- UCIL asked to submit a worst case scenario for a disaster at the licensed plant, and this information passed on to the civic authorities, hospitals, army and other neighbouring industries for drawing up contingency plans.
- The local meteorology department asked to collect data on local weather conditions and

conduct advance exercises on the dispersion of chemicals and gases in the atmosphere with the aim of preparing projected concentration gradients of toxic gases (isopleth maps) of Bhopal.

- UCIL should have been ordered to use the safest methods of storing gases — in a series of small tanks rather than in a few huge tanks, so that in the event of a failure only a small amount of gases would have leaked.

By the people:

- Since a new plant was coming up in Bhopal, citizens' groups, municipal councillors, MLAs, MPs, should have asked the government and UCIL for hazard and pollution details concerning the plant. A task force of safety experts, responsible citizens and administrators of Bhopal should have been set up to suggest guidelines for monitoring the safety procedures and policies of the plant.

Event, December 1979:

Plant goes into production.

What was done:

- Factory inspectorate given no special instructions regarding the hazardous nature of the plant.
- No information regarding possible hazards shared by UCIL with medical and civil authorities and with the residents of the area.
- Workers not educated about the nature of products they handle. Safety manuals kept secret or inaccessible.

What should have been done:

By UCIL:

- Worst case scenario studies and associated plans could have been instituted even at this stage.
- UCIL should have informed the civic authorities of the hazardous chemicals stored at the plant.
- Workers should have been specially drilled for emergencies and first aid.
- Residents of surrounding areas given education about what to do in case of emergencies.

By government:

- A disaster contingency plan prepared by the authorities in collaboration with UCIL management, workers and citizens' groups.
- Requested UCIL to give all information about known antidotes and protection measures for the hazardous products and intermediaries. This information should have been deposited with the libraries of all local medical institutions.
- UCIL asked to conduct research on MIC on a priority basis since enough was not known about its toxic properties.

By the people:

- Continue pressure on UCIL and government to give details about Bhopal plant, by MPs, MLAs, citizens.
- People of surrounding areas could have started discussions about disaster management, evacuation plans, etc. Help of workers'

unions could have been taken.

Event, 1980-1984:

Accidents, leaks and warnings.

- December 1981: Ashraf Khan, a UCIL worker, dies after a phosgene spill.
- October 1982: 17 workers injured and hospitalised after a mixture of chlorine, MIC and hydrochloric acid leaks out.
- Cattle die as a result of drinking water from pond receiving UCIL effluents.
- Raj Kumar Keshwani, local journalist, keeps writing articles about the lethal nature of the chemicals at the plant, the lack of safety measures, and danger to the city.

What was done:

- Ashraf Ali's case was handled by Dr N. P. Mishra, professor of Medicine, Gandhi Medical College. Neither the cause of death nor any other medical information was made public. Agitation by UCIL trade union employees. Letters of complaint sent to the prime minister, chief minister, central and state ministers and the local police station. No response from anyone including the citizens of Bhopal.
- October 1982 event handled as a "normal" accident. Patients were again treated by Dr Mishra but no medical information released. No special enquiry instituted. No record of the causes and events made public.
- UCIL fenced the pond where cattle were drinking water but remained silent on the nature of chemicals and the reason why they were being released into the pond. No government enquiry.
- May 1982: Union Carbide USA sends team to look into safety arrangements at UCIL Bhopal. Some excerpts from their records: (i) Manual control of MIC feed tank creates problems of accidental overfilling; (ii) pressure gauge on phosgene tank out of order; (iii) leaking valves common; (iv) the flare seal pot liquid level gauge glass valved in and level alarm unreliable; (v) no fixed water spray system for fire protection or vapour cloud dispersal in the MIC operating areas; (vi) method of installation of bond flanges on process line valves such that toxic materials can be trapped between flange and valve, and released when flange removed.
- UCIL does not share this information with the Factory Inspectorate, trade unions or the public. Most recommendations ignored by UCIL.
- Factory continues to receive clearance from the Inspector of Factories.
- Human settlements around the factory continue. In 1984, Arjun Singh, the then chief minister of Madhya Pradesh, gives "pattas" (ownership rights) to squatters in JP Nagar just across the UCIL factory.
- Safety Manuals not translated into Hindi by UCIL. Workers not allowed to retain safety manuals or take notes during instructions.

What should have been done:

These events should have been treated as warning signals by all parties and many of the measures associated with the worst case scenario instituted even at this stage.

By UCIL:

- All factory workers should have been instructed in first-aid measures needed in case of chemical leaks and this information shared with community leaders in surrounding populations.
- The number of gas masks in the factory, should have been increased to ensure that there were enough for all workers required to be present during an emergency.
- Safety manuals could have been made much more accessible and translated into the mother tongue of the workers.
- Observations of the Union Carbide team from headquarters taken seriously and recommendations implemented.

By government:

- The UCIL factory should have been closed down and Union Carbide asked to ensure that the safety equipment, procedures and processes were made as safe as in similar plants in the USA and Europe.
- The working of the Factory Inspectorate should have been reviewed and the organization given equipment and trained personnel adequate to deal with a factory of UCIL's complexity and hazardous nature.
- The State Pollution Control Board should have analysed the pond water and conducted an enquiry into the source of toxic chemicals.
- Special drills started involving the radio and TV station and local sirens, so that the public could distinguish between normal sounding of sirens and different types of warning sirens. For example, in some situations it is better for the people to stay indoors and close all doors and windows and in others to rush to centres of safety. Different siren sounds can be designed for these situations. People can also be educated to move in a direction perpendicular to the prevailing wind direction as the shortest escape route in most situations involving a gas leak.

- A systematic assessment of the medical experience at the Gandhi Medical College should have been conducted and conveyed to the medical authorities, UCIL, workers and civic authorities for future reference.

- Plans could have been made to shift people away from around the plant and to rehabilitate them. Alternatively, the plant itself could have been shifted to a safer zone.

By the people:

- Demanded enquiries into each event and asked for all findings to be made public.
- Asked UCIL to make public all corrective action.
- Set up a UCIL vigilance group to keep track of accidents and safety procedures at the

plant.

Event, September to November 1984:

Major problems at the plant.

- For reasons of economy the refrigeration system around MIC tanks switched off, staff reduced and under-trained staff posted in critical positions — all with the full knowledge of authorities in Union Carbide USA.
- Vent gas scrubber put on stand-by, flare tower disconnected, leaks in system and lack of nitrogen pressure — making the safety systems almost non-existent.

What was done:

Authorities not informed and Factory Inspectorate kept in the dark.

What should have been done:

By UCIL:

- Union Carbide USA should not have allowed such unsafe procedures to be adopted at Bhopal.
- Authorities should have been informed of the unusual situation at the plant and efforts made to ensure that emergency measures were instituted to make the plant safe.
- Parallel connection to flare tower and special arrangements for maintaining nitrogen pressure should have been made.
- Special training in safety measures started in view of the unusual conditions.

By the people:

- UCIL trade unions should have made public the situation in the factory.

Event, 2 December, 1984:

About 30 minutes before the leak, the pressure pump packs up and there are indications of pressure and temperature rising.

What was done:

Workers try to handle the situation. No senior officers present at the plant.

What should have been done:

By UCIL:

- Senior officers of UCIL should have been present and they should have requested a senior civil administrator to stand by for information on further developments.
- MIC should have been pumped out into empty standby tanks.

EVENTS DURING THE GAS LEAK

Event, 2-3 December:

Gas leaks explosively from the UCIL plant between 11.30 pm and 2.30 am. A light breeze blows the gases towards the city.

What was done:

- Internal plant alarm sounded in time but factory siren sounded at about 2.00 am.
- Administration not informed by UCIL.
- Works Manager arrives at 1.40 am with towel wrapped around his face.
- When contacted by the police a senior UCIL officer says, "Nothing is wrong, there was a

gas leak but everything is under control".

- UCIL works manager, J. Mukund, says "How can there be a leak in my plant? It's been shut down".
 - UCIL authorities do not disclose what gas has leaked.
 - Only two gas masks available in the plant. Most UCIL workers on duty abandon plant and move upwind to safety.
 - Panic and mass exodus by people downwind of factory.
 - No known formal orders given by the chief minister, home minister, district magistrate or inspector general of police.
 - Most VIPs and officials flee city in staff cars.
 - Radio and TV remain silent.
 - Some officers act on their own initiative, even heroically. Superintendent of Police, Swaraj Puri, takes over the control room and tries to manage the crowds by making announcements from a jeep. Roads packed with people fleeing in great confusion. Police vehicles and some drivers of official cars help on personal initiative.
 - Lucknow-Bombay Express arrives in Bhopal at 1.10 am and many passengers taken ill. Messages sent by railway officials for all trains to stay away from Bhopal.
 - First patients report to Hamidia Hospital at 1.15 am.
 - Thousands of patients throng hospitals, hundreds die soon after arrival.
 - Hundreds die or are incapacitated because of the gas and fall on the roads.
 - Medical students and young doctors handle work with dedication. Many affected by gas. Symptomatic relief given in the absence of any clear-cut instructions.
- What should have been done:**
- By UCIL:**
- All UCIL management personnel should have arrived at the plant immediately to assess the situation.
 - UCIL should have sent a message to their headquarters immediately asking for advice on all matters including medical.
 - Civil authorities informed about the situation immediately and a group set up to manage the emergency.
 - External siren should have been sounded immediately and all sirens in the city made to do the same.
 - Gas masks requested from authorities and other institutions for use by essential staff and functionaries.
 - UCIL chief medical officer should have extracted all medical information from his files and rushed to Hamidia Hospital to set up a medical coordination centre instead of spreading disinformation: "MIC is an irritant but not fatal gas". An attempt was also made to confuse everyone about which gas had leaked.
 - UCIL officials knew that wet towels wrap-

ped around the face offered protection from the gases. This information should have been shared with the police authorities and publicised widely.

By the government:

- The chief minister should have asked the district magistrate to set up a Command Centre to coordinate the emergency situation and asked All India Radio to start broadcasts with a skeletal staff.
- Heads of all government organisations asked to stand by for further instructions.
- Meteorology department and the airport should have been asked to give details regarding wind direction and other weather conditions.
- The nearest army and airforce stations requested to standby for help and services of helicopters requested to survey movement of gas cloud and people and even broadcast instructions.
- All surrounding districts warned of the situation in Bhopal.
- People should have been asked to leave their homes with transistor radios so that they could receive instructions and advice while on the move.

EVENTS AFTER THE GAS LEAK

Event, 3 December, 2.30 am to sunrise:

Gas leak stops at 2.30 am but the gas cloud moves slowly across the city. People continue to run for their lives.

What was done:

- People are helped to flee the city by private bus operators, tempos, hand pulled rickshaws, thelas, auto rickshaws etc.
- Army takes initiative in rescue and relief.
- Large number of patients crowd hospitals.
- Army and civil authorities start removing dead bodies.

What should have been done:

By UCIL:

- By this time UCIL could have received all the details regarding MIC from their headquarters and shared the information with local authorities.

By government:

- The standard disaster plan should have been put into operation.
- All Bhopal doctors, government and private, and those in neighbouring districts put on the alert.
- A small team of doctors at the medical college should have been taken away from clinical duties and asked to work in the library and extract as much medical and toxicological information about the various gases which could have leaked from UCIL. This information should then have been shared with all

other doctors.

- A task force set up to plan arrangements for dead bodies.

Event, 3 December:

No further accident in factory. Full scale of tragedy clear around mid-day. False alarm of another leak.

What was done:

- UCIL still spreading disinformation and of no help in treatment of victims.
 - No advice regarding the disaster on radio or TV all day. Radio announces 60 dead!
 - Some elements of the bureaucracy start attempts to remove the dead bodies. Rumour of bodies being disposed off illegally.
 - Railway doctors arrive from nearby areas and start visiting railway colonies.
 - No standard instructions to doctors about treatment or to give treatment slips to victims.
 - No special arrangement to catalogue information about the dead or to preserve the dead bodies.
 - No special efforts made to collect samples of air, water, food etc for scientific testing.
 - Dr Heeresh Chandra, Professor of Forensic Medicine and Toxicology, claims evidence of cyanide poisoning among victims, but no special scientific efforts made to understand the phenomenon.
 - A CBI team arrives to conduct an enquiry which was expected to be completed in four weeks.
 - A second exodus in the afternoon because of the false alarm.
 - Overwhelming response from people of Bhopal to help victims but little coordination. At times authorities make it difficult for volunteers to do their work effectively.
 - Private organisations collect and distribute medicines, which were supplied even to hospitals.
 - People start moving back to the city towards the evening. Great deal of confusion in locating the sick, dead, and the missing.
 - Large number of people reach surrounding towns and villages. Many hospitalised.
 - Many exposed to the toxic gases trapped in their homes when they return.
- What should have been done:**
- By UCIL:**
- Set up a coordination cell with direct access to US headquarters to cooperate with government.
- By government:**
- Government should have sealed factory so that no documents or equipment could be tampered with.
 - Army/CRPF/Police mobilised to help people in distress and protect city from vandalism.
 - A disaster command centre established for coordinating medical, relief, administrative, legal, lost and found and communication work.
 - Tent cities set up for lost children and those

victims who did not want to return to their homes. Centralised coordination centre for keeping track of lost and found people should have been set up and widely advertised. Proper arrangements should have been made for taking care of lost persons.

- Surrounding districts alerted to send water, food, clothes and doctors.
- Authorities and voluntary agencies in all metropolitan cities alerted that help may be necessary so that they could mobilise resources if needed. Government could keep transport planes ready at airports if needed.
- Central health authorities should have been asked to obtain health information for gas victims from national and international experts using all international computer networks for the purpose.
- TV and radio should have been used continuously to inform people about the situation and to calm them down. People should have been given medical and first aid instructions and informed timings for specific broadcasts on health, relief, legal aspects, and lost members of families. People could have been advised to stay with friends and relatives in other towns till situation declared normal.
- Plans for keeping a large number of people away from Bhopal should have been made.
- All food, meat, poultry etc exposed to gases should have been quarantined immediately and people informed not to panic as adequate arrangements for food from outside were being made.
- People should have been warned not to drink water stored in open containers on night of leak as toxic chemicals may have dissolved in it.
- Task force set up to start making arrangements for collection of epidemiological data information on treatment of victims, research on symptoms, extent of tragedy etc.
- A special effort should have been made for storage of dead bodies for as long as necessary for medico-legal purposes. Arrangement could have been made for getting ice from outside Bhopal if necessary. Arrangement for proper record keeping started immediately.
- Instructions should have been issued to medical personnel to keep records of all patients treated/admitted.
- Arrangements should have been made to collect samples, of air, food stuff, animals, flora and fauna for future analysis.
- The Factory Inspectorate should have examined factory for possibility of further danger.
- An inventory of all chemicals stored in the factory should have started.
- A team of specialists should have been asked to prepare a special form for recording details of symptoms and treatment of gas victims and also a patient card to be retained by the patient. These could have been printed in

thousands overnight for distribution the next day.

By the people:

- All victims should have been fed by relief kitchens. Not a very difficult task. Just a month earlier, almost 50,000 sikhs (victims of violence which ensued after Mrs. Gandhi's assassination in Delhi) were fed mainly by voluntary effort with less than 24 hours notice.
- Local eminent citizens should have gotten together and inserted advertisements in all local and national newspapers asking for donations and help and announced formation of a voluntary coordinating body.

Event, 4 December:

News announced in all newspapers and officials, doctors, lawyers, volunteers start coming to Bhopal.

What was done:

- No special briefing for doctors.
- Many foreign experts arrive. No coordination or control.
- Suppression of information starts.
- No public education on health or any other related matters.
- Prime minister declares air, food and water safe in Bhopal though no scientific tests had been conducted till then.
- Systems for storing and analysing data not set up till mid-1985.

What should have been done:

By UCIL:

- UCIL should have collected all necessary information about MIC from all data banks around the world and flown the information to Bhopal by special couriers from around the world.

By government:

- A Bhopal Disaster Enquiry Committee should have been set up immediately.
- The army/police authorities should have been asked to do a mapping of the affected areas using aerial photography if necessary.
- The census system should have been alerted to do a census of Bhopal immediately and to record data relevant to the disaster.
- Government photographers along with private ones hired specially for the purpose should have photographed all dead bodies for the record and duplicates displayed by the coordination centre for identification purposes.
- A large medical team consisting of doctors from outside Bhopal (army and/or civilians) should have been assembled for working in Bhopal for at least one month, but with the idea of a long term team being established in Bhopal. This would have enabled the local doctors to continue with their normal duties.
- To ensure continuity each doctor should have been assigned to specific locations. Victims should have been informed that they would get free medical help only if they went to the doctor assigned to their specific locality.

By this method a unique number could have been assigned to each patient.

- Private doctors should have been requested to use the same forms and use the same record keeping as official doctors and a system set up to monitor all private doctors.
- Controlled experiments should have begun to determine the efficacy of Sodium Thiosulphate and other known antidotes to determine best treatment methods.
- Consultants should have been alerted that a data processing centre needs to be set up immediately in Bhopal.
- Coordination and briefing centres set up at airport/railway station/bus stand for meeting, helping and keeping track of experts, volunteers etc.
- A scientific committee should have been appointed to consider all decisions and liaise between the people and government.

By the people:

- The Medical Association of India should have started collecting names of doctors willing to work in Bhopal on a professional basis for medium and long term, and asked for urgent donations from its membership and speciality associations to sustain such an effort.
- Citizens groups could have set up a high-powered committee to demand information from the government and UCIL.

Event, 5 December to Operation Faith:

Treatment and relief measures continue. Demands for more professional approach and information by journalists and voluntary agencies.

What was done:

- Scientific teams from various national laboratories arrive but do not have any specific mandate. Official scientists very secretive.
- On 5 and 6 December, the Central Pollution Control Board collects air and vegetation samples and conducts tests for hydrogen cyanide in air. Details of tests never made public.
- Bhopal declared safe again on 7 December without details of tests being revealed to the public. The most sensitive tests were not completed at that time.
- Many senior bureaucrats and political leaders continue to get vegetables from outside Bhopal (Panchmarhi). People asked to boil water and wash vegetables though these procedures are not necessarily effective.
- Still no reliable figures available of the sick and the dead.
- No instructions to doctors or victims to adopt a common approach.
- No coordination with foreign scientists who were collecting environmental and pathological samples freely.
- Most people back in Bhopal.
- Suggestion made by citizens to set up a committee of well known chemical engineers

not accepted by Dr Varadarajan.

- Many voluntary groups get active in providing relief and helping victims. Little coordination or cooperative among voluntary groups.

What should have been done:

By UCIL:

- A large disaster relief fund set up and offered to the authorities in Bhopal.

By the government:

- By now it was clear that (i) this was the largest industrial disaster ever (ii) there may be long term medical consequences among the victims, (iii) many complex scientific and legal issues were likely to crop up, (iv) a massive rehabilitation effort would be needed.

- Decision to start a permanent Bhopal UCIL Disaster Research Centre should have been taken..

- Personal computers and data processing experts should have been flown in.

- A scientific liaison committee should have been taken into confidence by the official scientists. The former should have been charged with educating the public and voluntary groups.

- All food materials, flora, fauna, should have been tested by the most sensitive tests before declaring Bhopal safe.

- Health education programmes on Radio, TV and through public lectures should have been started.

- Since victims were going from doctor to doctor taking the same medicines (anti-histamines, cortisones, broncho-dilators, antibiotics and steroids), special efforts should have been made to educate the public that many medicines look different but have the same ingredients.

- Doctors appointed for long term treatment and a central record keeping system established. Epidemiological and medical studies should have been started. For example, controlled studies should have started on various treatment regimes, lung function of victims measured on portable spirometers.

- An escrow account should have been opened by the government for relief and rehabilitation of the victims.

- The National Sample Survey Organisation could have been requested to set up a sampling system for long term monitoring of victims.

- If necessary, arrangements could have been made to keep victims out of Bhopal until city declared safe.

- The government should have engaged the best experts in concerned medical and engineering fields to help the disaster research centre.

- Legal proceedings started against Union Carbide under threat of closing down all their activities in India.

By the people:

- MPs, MLAs, citizens groups and workers' unions should have been much more vocifer-

ous in demanding facts and information.

- A coordination group should have been set up among the voluntary agencies for sharing information and planning tactics.

- Citizens of Bhopal should have formed voluntary groups of long term work among the victims. Appeals for funds could have been made around the country.

Event:

Operation Faith, neutralisation of MIC

What was done:

- Unnecessary drama associated with the neutralisation process.

- People not given clear-cut instructions and hence another exodus from Bhopal at great cost and pain to many of the citizens. Some had to make distress sales of their belongings to gather some money.

- Scientists and concerned citizens not taken into confidence by the authorities.

What should have been done:

- The method selected for neutralisation of MIC should have been based more on Indian or hired expertise, rather than mainly on Union Carbide USA.

- Official scientists should have shared information and decision making with concerned and responsible citizens of Bhopal.

- Unambiguous advice should have been given to the people. If neutralisation methods were not considered safe enough, then arrangements should have been made for a relatively comfortable shifting of people away from Bhopal and people advised to shift. However, if there was no danger, then this should have been stated categorically.

EVENTS POST NEUTRALISATION OF MIC

What was done:

- UCIL makes no significant contribution to rehabilitation or relief of victims, causes confusion and evades responsibility.

- US lawyers (ambulance chasers) arrive in late December 1984 and engage local lawyers to sign up victims. Victims sign all kinds of papers without knowing what they were doing.

- Much later, government of India announces that it is the sole representative of the victims for legal purposes and files a case against Union Carbide in USA, later transferred to India.

- First large survey of victims done by a team from Tata Institute of Social Sciences. Team unfamiliar with Bhopal and local language, not trained in epidemiology. Results not considered reliable and details never made public.

- A scientific study commissioned by the government to analyse causes of failure.

- Indian Council for Medical Research plans

about 30 medical research projects in early 1985. First set of results made public in late 1987. No overall framework for studies, which were based on individual scientists' interests with no strong links among them. Little interest in long term investigations.

- Confusion about medical treatment and diagnosis continues and central and state authorities often at cross-purposes.

- Haphazard and inadequate relief.

- Many voluntary agencies active. Government under pressure because of the efforts of these groups. Medical and epidemiological studies attempted by them. Great deal of debate, confusion and differences among voluntary agencies. This situation exploited by government and UCIL and voluntary workers harassed, arrested and attempts made to discredit them.

- Unaffected Bhopal citizenry almost indifferent to the plight of victims after a few months.

What should have been done:

By the government:

- A large permanent research and relief centre should have been set up which would have performed the following tasks:

- (i) Coordinated in-house medical research with experts nationally and internationally
- (ii) Kept track of all victims for the rest of their lives
- (iii) Made comprehensive plans for relief and rehabilitation
- (iv) Conducted a long term epidemiological study
- (v) Planned and executed education programmes for victims on health and legal matters
- (vi) Raised funds nationally and internationally for the victims
- (vii) Coordinated information and data bank to aid lawyers working on case against Union Carbide
- (viii) Kept the issue alive in Bhopal
- (ix) Become a centre for research on industrial disasters in developing countries
- (x) Established Union Carbide's liability and criminal negligence by going through the legal process irrespective of the time taken.

By the people:

- Citizens of Bhopal should have collected funds (i) to institute long term voluntary efforts in Bhopal to keep the city involved in the welfare of the victims, (ii) given relief in kind and cash for victims over an extended period of time (iii) to appoint professional sub-committees to pressure the authorities to do the kind of work indicated above.

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DISASTER PREPAREDNESS

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1. INTRODUCTION

1.1 Overview of Disasters

By WHO's definition, a disaster is any occurrence that causes damage, economic disruption, loss of human life and deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area. Disasters which may be classified as natural or man-made usually occur suddenly and unexpectedly, disrupting normal life and infrastructure for social services, including health care systems. The importance of preventive planning for disaster management is undeniable. In the health field, a country's health system and public health infrastructure must be organized and ready to act in emergency situations as well as under normal conditions, and must be cognizant of the types of measures to be taken in the event of a disaster. These will differ according to the type and severity of impact of the disaster on the affected population, service infrastructure and environment.

Disasters have increased/in a number of events and in /significantly scope during the past few decades, On an average, from the 1960s to the 1980s, there had been a five-fold increase in the frequency of disasters, with an augmentation of total economic and human losses. According to information available from one of the WHO collaborating centres, South-East Asia Region, by its geographical location, stands fourth in the global disaster scenario (Table 1).

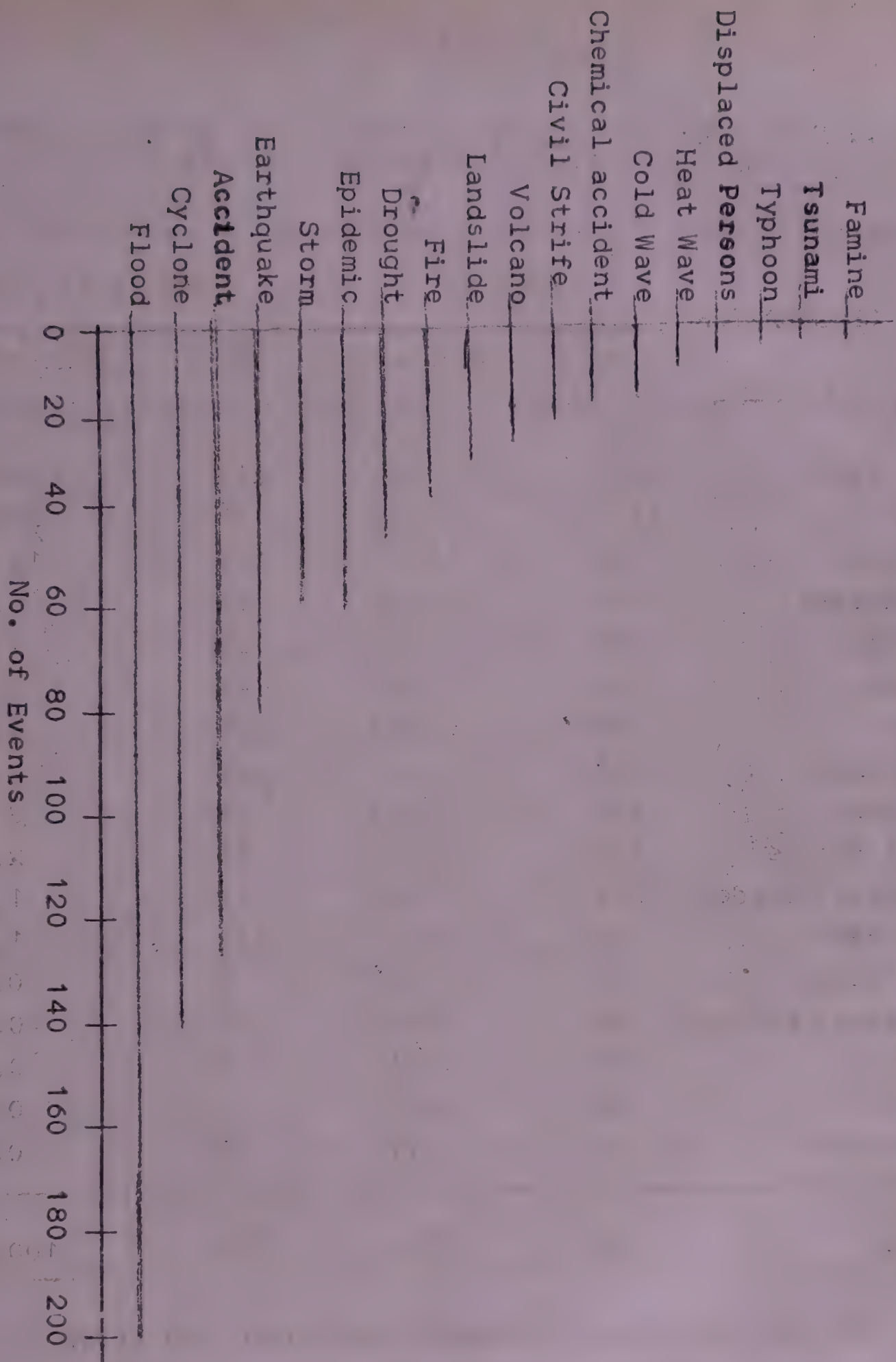
Disaster due to natural and other causes continue to afflict several countries of the Region, particularly Bangladesh, India and Indonesia, where cyclones, floods, landslides, volcanic eruptions, earthquakes and drought have created emergency situations of varying degrees. Figure-1 shows the main type of disaster that affected SEAR countries during the period 1900-1991.

TABLE-1: FREQUENCY DISTRIBUTION OF DISASTERS IN THE WORLD AND IN THE SOUTH-EAST ASIA REGION (1900-1991)

TYPE OF DISASTER	GLOBAL		SOUTH-EAST ASIA	
	No.	Percentage	No.	Percentage
High Wind ^a	1473	21.09	216	24.32
Flood	1198	17.15	197	22.18
Accident	814	11.66	127	14.30
Earthquake	951	13.62	83	9.35
Epidemic	284	4.07	66	7.43
Drought	566	8.10	45	5.07
Fire	663	9.49	35	3.94
Landslide	186	2.66	27	3.04
Volcano	132	1.89	26	2.93
Civil Strife	202	2.89	18	2.03
Chemical Accident	247	3.54	13	1.46
Cold Wave	55	0.79	12	1.35
Heat Wave	33	0.47	8	0.90
Displaced Persons	85	1.22	6	0.68
Tsunami	31	0.44	5	0.56
Famine	35	0.50	3	0.34
Avalanche	29	0.42	1	0.11
Total	6984	100.00	888	100.00

^aIncludes all cyclones, typhoons, hurricanes and storms.

FIGURE-1: NUMBER OF DISASTERS, BY TYPE, IN THE SOUTH-EAST ASIA REGION, 1900-1991



Source : WHO Collaborating Centre for Research on the Epidemiology of Disasters(CRED)

The frequency of disasters in the Region has nearly quadrupled during the last thirty years with their impact on populations ranking on top over other regions (Table-2). It is mainly because of continuous increase in population, concentration of population in urban areas and active population migration to different parts of the country, including high-risk areas.

TABLE-2: COUNTRIES WITH THE HIGHEST PREVALENCE OF DISASTERS, BY TEN-YEAR PERIODS, 1960-1969 to 1980-1989^a

Country	1960-1969	1970-1979	1980-1989
Bangladesh	18	37	77
India	34	102	172
Indonesia	20	46	88
Myanmar	10	10	24
Nepal	7	8	19
Sri Lanka	5	8	25
Thailand	4	5	25

^aReported events only. Lack of reporting for several countries in the Region effectively distorts the ranking of countries.

Source: WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED), Brussels, 1991.

As far as future risks are concerned, it is apprehended that global warming, due to increased carbondioxide emission, may lead to increased frequency of storms, rise in sea levels and submergence of low-lying island countries. Deforestation leads to drought and famine. Similarly, disasters may change the environment by affecting vegetation, soil, air and water.

1.2 Public Health Impact of Disasters

Human impact in the aftermath of disasters is manifested in injuries and deaths or diseases and disability. They also affect services essential for human survival, i.e. shelter, water supply, food stock and distribution systems, and sanitary and sewerage facilities. Disasters can alter environmental conditions in many ways leading to hardships and suffering of the affected population. Environment and disasters interact so closely that the effect of one is felt on the other. Earthquakes cause landslides, avalanche; tropical cyclone leads to

flood, soil erosion; and volcanic eruptions cause soil destruction and groundwater disturbances. Environmental effects of pollutions and human activities have a direct bearing on the ecosystem. These effects may reach the population through different pathways such as water, air food or consumer products. Therefore, water supply, waste disposal, air pollution, food contamination and pesticides may be factors that cause adverse health conditions.

The number of disaster victims in the world is increasing. When it comes to death, not all disasters are equal. Among natural disasters, the greatest number of deaths results from tropical storms. Other types, however, may be more likely to produce injuries or property damage. Table-3 shows the numbers of people killed and affected per year, by type of event, and Table-4 shows the disaster impact in some SEAR countries during 1964-1986.

TABLE-3: NUMBERS OF PEOPLE KILLED AND AFFECTED PER YEAR, BY TYPE OF EVENT, WORLDWIDE.

TYPE OF EVENT	KILLED		AFFECTED	
	1960s	1970s	1960s	1970s
Drought ^a	1010	23110	18000500	24400000
Flood	2370	4680	5200000	15400000
Civil strife/conflict	300	28840	1100000	4000000
Tropical cyclone	10750	34360	2500000	2800000
Earthquake	5250	38970	200000	1200000
Other disasters	2890	12960	200000	500000
TOTAL	22570	142820	27200500	48300000

^aExcludes the 1959-62 famine in the People's Republic of China
Source: UNDRO NEWS, Jan/Feb 1988

TABLE-4: DISASTER IMPACT IN SOME SEAR COUNTRIES, 1964-1986


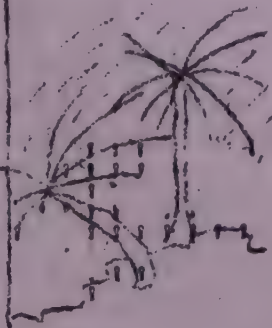

Country	No. of Events	Affected Population	No. of Deaths	Estimated Loss (thousandUS\$)
Bangladesh	80	141327727	418861	2535579
India	143	746437482	71627	5811187
Indonesia	96	8212827	16274	687278
Myanmar	27	2469162	1816	143804
Nepal	19	4913524	2531	266913
Sri Lanka	25	10256402	1903	220312
Thailand	17	7847070	748	519400

Source: Asian Institute of Technology, Bangkok

The destruction of sanitary and sewerage facilities due to disasters leads to indiscreet disposal of liquid and solid waste and excreta, creating conditions favourable for the occurrence of vector- and water-borne diseases. Disasters also compel people to live in resettlements where environmental health measures, such as ensuring safe drinking water and food, proper excreta and waste disposal, need particular attention as important preventive interventions against diseases and illnesses. Health implications in these instances usually manifest in the form of food- and water-borne diseases. Health facilities, including medical stores and equipment, as well as medical and health personnel and their families, are also affected by disasters. This greatly hampers the immediate mobilization of medical and public health services. All disasters are unique as far as medical, social and economic impacts are concerned. Specific for health, there is a relationship between the types of disaster and their effect on health. For example, earthquake usually results in injuries requiring medical attention, whereas cyclone and flood cause relatively moderate to few injuries. Figure-2 shows the effects of natural disasters on health.

Population concentration in temporary shelters leads to increased risks of disease transmission due to overcrowding and unhygienic conditions. The actual and potential health risks after disaster appear at varying times. Casualties mainly occur at the time and places of impact, while increase in disease incidence takes a longer time to develop and is the greatest where there are overcrowding and poor sanitation. Snakebites are common after floods in the Region. The destruction of food stock and disruption of the food distribution system may produce food

FIGURE-2: EFFECTS OF NATURAL DISASTERS ON HEALTH

Frequently observed SHORT TERM HEALTH EFFECTS OF MAJOR NATURAL DISASTERS	 EARTHQUAKE	 HIGHWINDS	 TIDAL WAVE FLASH FLOOD	FLOOD
DEATHS	MANY	FEW	MANY	FEW
SEVERE INJURIES REQUIRING INTENSIVE MEDICAL CARE	OVER WHELMING	MODERATE	FEW	FEW
INCREASED RISK OF INFECTIOUS DISEASE	POTENTIAL PROBLEM IN ALL MAJOR DISASTERS (Probability rises with overcrowding and deteriorating sanitation)			
FOOD SCARCITY	RARE (May occur due to factors other than shortage of food)	RARE	COMMON	COMMON
MAJOR POPULATION MOVEMENTS	RARE (May occur in heavily damaged urban areas)	RARE	COMMON	COMMON

Source: Scientific Publication No.438, PAHO, 1983.

shortage. People already with borderline nutritional status may show signs of nutritional deficiency if the shortage remains for a few weeks. Anxiety, neurosis and depression may be seen mainly due to shock and insecure conditions caused by multiple factors, such as loss of property, loss of near and dear ones, stress due to altered living conditions, etc.

2. ELEMENTS OF DISASTER PREPAREDNESS

2.1 Disaster Area Mapping

Since prevention of disasters is not in sight, advanced preparedness measures, especially in the health sector, are needed to deal with immediate post-disaster health problems. The relevance of health sector preparedness is on the basis that communication with the affected population from outside is usually not possible for at least a few days. Potential situations and the nature of impacts of disasters may be determined by past history, including frequency, based on which disaster mapping can be done with the main objective of identifying high-risk areas. This map, which is a part of the community profile, should be prepared with the participation of the local community. It is valuable in identifying and making known potential hazards to life and health to which the local people are exposed. However, such a map will assume usefulness only when used in association with the mapping of resources : water, food, rescue and relief materials. Some of the basic information required is : (a) type of disaster (b) period of disaster and duration, (c) frequency of occurrence (d) impact of disaster on area, population by age/sex, types of houses, basic facilities and water supply, food distribution, etc., (e) type of support service - transport and communications (f) health facilities, (g) NGOs and other organizations operating in the area, and (h) major problems encountered in past disaster events (disaster memory).

Epidemiological surveillance of disaster-prone areas is important for generating the information required for disease control. This information includes baseline data on occurrence of disasters; epidemic threshold; population at risk; disease pattern in neighbouring areas; list of diseases likely to be aggravated by disaster situations and their mode of transmission. Disease surveillance is very important once the affected population is resettled. Table-5 shows the diseases to be monitored when people are housed in temporary shelters.

TABLE-5: DISEASES TO BE MONITORED WHEN PEOPLE ARE HOUSED IN TEMPORARY SHELTERS

Disease ^a	Main Causes
Diarrhoeal Diseases	Overcrowding; contaminated water and food
Measles	Overcrowding
Respiratory Complaints	Poor housing conditions; shortage of blankets and clothing

TABLE-5 (Contd..)

Disease ^a	Main Causes
Malaria	A new environment with a type of malaria against which refugees have no protection; stagnant water becoming a mosquito breeding ground
Meningococcal Meningitis	Overcrowding in a region where the disease is endemic (it is often seasonal in certain places)
Tuberculosis	Overcrowding
Helminths, particularly hookworm	Overcrowding; poor sanitation
Scabies (a skin disease caused by mites)	Overcrowding; poor physical hygiene
Xerophthalmia (infant blindness)	Vitamin-A deficiency (xerophthalmia is often provoked by measles or some other acute infection)
Anaemia	
Tetanus	Malaria, hookworm, shortage or poor assimilation of iron or and folate Injuries in an unvaccinated population. Poor obstetrical practice may cause tetanus of the newborn.

2.2 Planning for Disaster Preparedness

Few types of natural catastrophe can now be predicted accurately. Exceptions are tidal waves and, to a lesser extent, destructive winds. Although hurricanes can be tracked by weather satellites, their exact point of impact remains uncertain until very shortly before it occurs. Earthquakes, destructive winds and floods do occur in well-defined areas particularly prone to natural hazards. Preparedness for disaster is therefore possible.

A national plan for disaster preparedness should identify the types of disasters, disaster-prone areas, population at risk, process and procedures for warning, evacuation mechanism, relief

operation, restoration and rehabilitation. It should establish linkages between development activities with relief operation, restoration and rehabilitation measures. For post-disaster period, the plan should include an evaluation of response measures, cost-effectiveness, sharing of experiences among all concerned units, and rehabilitation measures, as well as updating/revision of the plan itself, if needed.

Where disaster is a regular and recurrent threat, disaster planning is generally incorporated into the government structure. In countries where the risk of disaster is real but their occurrence infrequent, the difficulties and cost of maintaining a sophisticated preparedness structure must be recognized. Disaster preparedness is a permanent multisectoral activity to which the contribution of the health sector is essential. Disaster preparedness consists of the following.

(1) Vulnerability Analysis

This is carried out mostly by government agencies responsible for disaster relief and rehabilitation. However, the responsibility of the health sector is of the utmost importance since it deals with the vulnerability of people's health, health facilities, i.e. buildings and services, including systems for safe drinking water and basic sanitation.

(2) Establishment of a National Coordination Mechanism

This should require that special legislation be adopted and that a specific office be designated. A health official should be appointed as the focal point for coordinating health activities for disaster preparedness. Legislation may have to be amended to provide extraordinary authority for waiving death certification and formalities, licensing foreign physicians and other health workers to practise legally in the country, waiving import regulations affecting key supplies, such as certain drugs, and requisitioning private services or goods.

(3) Preparation of Plans of Operation

Pre-disaster planning does not consist of merely one-time preparation of a plan but is a continuous process in all essential public sectors such as health, water, power and public works. The following guidelines may be kept in mind :

- a) Plan for probable events and likely health needs created by disaster. To be effective, planning must be directed towards specific and realistic ends such as how to cope with unsolicited assistance and making the best use of available resources.
- b) Plan for the main features of administrative response such as location and general responsibilities of key officials. The plan should not be complicated with too many details and should allow for ad hoc and improvised responses to fill in gaps.

- c) The plan should be subdivided into self-sufficient units. Adequate response to a disaster generally does not require specialized officials such as hospital administrators, to know of the entire plan.
- d) The plans should be disseminated. To function properly, people with roles in it must know of the plan, which demands considerable training. Too many good plans have failed during emergencies for lack of adequate dissemination.
- e) Preparedness exercises should be included to test the plan periodically, for a plan is not realistic if it is not tested.

(4) Training of Health Personnel and the Public

Satisfactory preparedness cannot be achieved solely by drawing up operational plans, stockpiling supplies and compiling information. Health ministries in countries vulnerable to disaster should consider a comprehensive training programme. Specific training in first aid, search and rescue techniques, and public hygiene should also be given to the community and population at risk, and health officials should be instructed continuously in their respective areas of responsibility.

Most countries deal with day-to-day emergencies through their existing infrastructure through which a national plan for disaster preparedness can be rationally formulated for country-specific situations. The national plan needs the involvement of departments and agencies from all concerned sectors at all stages of development, i.e. planning, preparedness, response and rehabilitation. The functions of all concerned within their identified role and responsibilities, including cooperation among them, would need close monitoring and facilitation by a coordination nodal point which may be a department/agency at the national level designated to coordinate the entire emergency operation to ensure efficient and effective implementation of the national plan. Certainly, the nodal point for coordination with a full-time official will need administrative, political and constitutional support. Information on the national plan should be disseminated down to the grassroot for full participation and involvement of all concerned at all levels. Monitoring and evaluation should be an important built-in component of the plan which should be flexible enough to accommodate changing situations caused by disasters.

Complex public health problems in different types of disasters necessitate, at least to start with, the availability of knowledgeable and skilled professionals at the national level. The need for such personnel is increasingly being felt with the increase in disasters. Moreover, there are many areas, especially in industrial and biological disaster situations, where sufficient information about health impact is still not available. In countries prone to disasters, training and

research in emergency health care and disaster management should be an integral component of medical and public health educational programmes. This will prove extremely useful in handling disaster situations on a scientific basis.

Certain professional qualities in the event of a disaster have to be developed among local health personnel, especially the ability to estimate requirements and resources, which is the essential means of avoiding bewilderment and confusion. Apart from their own professional tasks, health personnel should also understand and be able to handle other factors - material, social and cultural - that have repercussions on the health of the affected population. In addition, they should also know the various aspects of life and moving forces of the community which will make it possible to bring about active community participation and effective joint initiatives essential for managing health problems. Furthermore, the local health personnel should be able to identify useful information, put it into circulation among the community in a constructive way, and dismiss false rumours.

In this connection, due consideration should also be given to manpower resource within the community itself, which could be very helpful if appropriate training was given to them during the pre-disaster phase.

In emergency preparedness, there should be emphasis also on community participation, local planning and development of self-reliance. The identification of hazards, assessment of risks, organization and management of action in emergencies and monitoring and evaluation of the impact of such action are best carried out with the close involvement of the community. Governments should given priority to training and development of managerial skills at that level in order to strengthen the capacity of the community to prepare for, and to cope with, disaster situations.

2.3 RESPONSE MECHANISM

(1) Health Sector Disaster Preparedness Plan

Health policy makers/planners are mainly involved in the preparation of country-specific health sector plan within the framework of national plans for disaster preparedness which involve several sectors, monitoring its implementation and coordination with other departments and agencies at the national level. Health managers are responsible for the deployment of health manpower, training of health personnel and the community logistic support for health activities, etc. At the operational level, health personnel are involved in putting the plan into actual operation.

The purpose of the health sector plan is to anticipate the health impact of potential emergency situations caused by disasters, initiate pre-disaster (preparedness) measures for

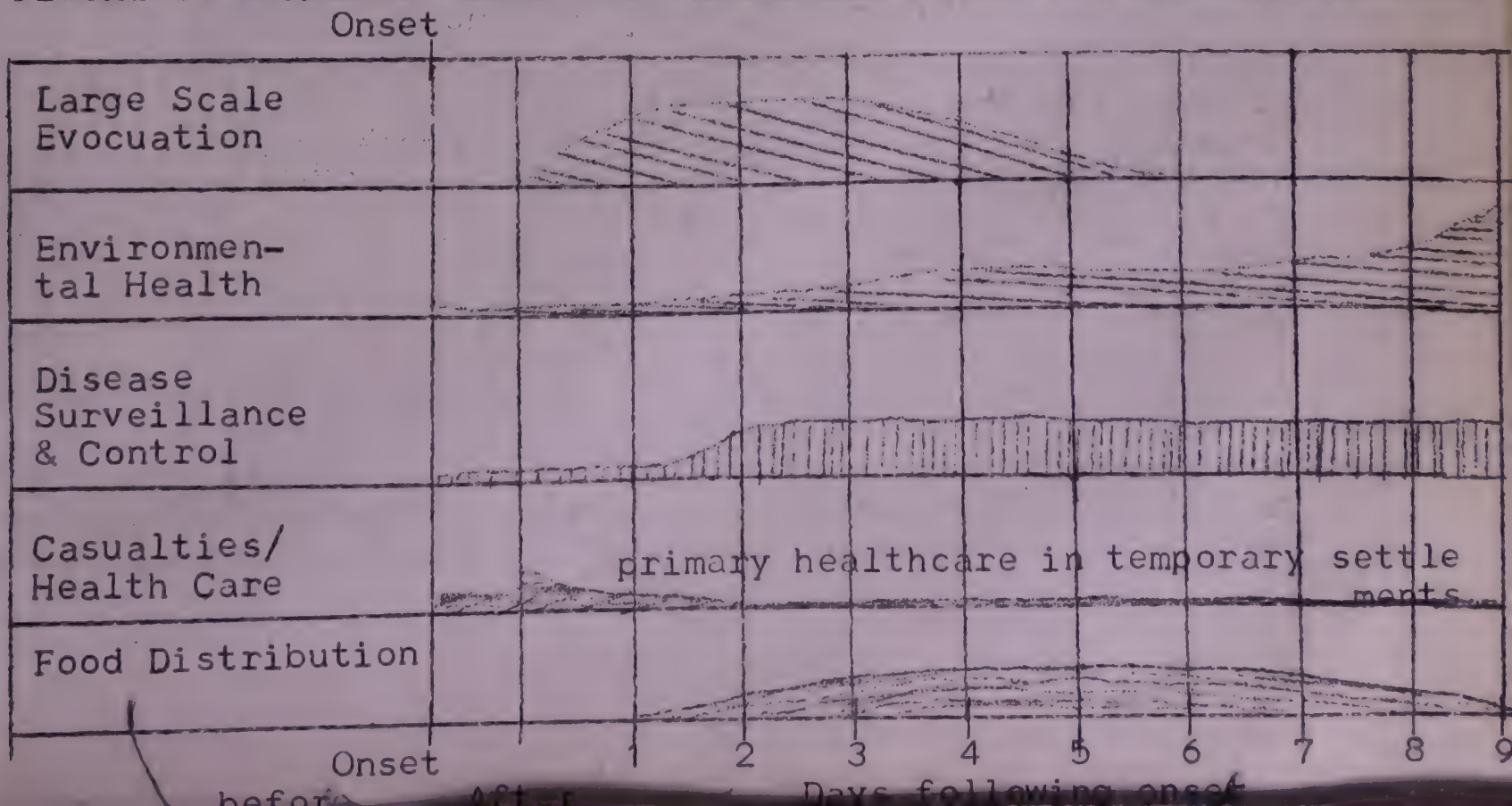
appropriate response to reduce morbidity and mortality using the existing infrastructure and the available resources. There are two main phases in this planning process, i.e. pre-disaster and disaster phases.

Pre-disaster phase involves anticipation and identification of potential disaster situations and areas; vulnerable population; potential health impact and additional health risks; specific action for casualty management and control of communicable diseases; types, quantity and location of resources; arrangement for quick mobilization of resources; plan for information support, including regular feedback from the fields; and plan for participation and involvement of the community. The local community should have an active role to play both before and after disasters, because a good state of preparedness in the community may reduce the impact of the disaster, the greatest number of lives can be saved before help arrives from elsewhere, and many problems of survival and health can be dealt with more efficiently if the community is active and well organized.

During the actual disaster phase, planning will include activation of the response mechanism; execution of pre-disaster plan; daily monitoring; updating of response measures, if necessary; and coordination of international assistance. It may be necessary to anticipate health needs during the pre-disaster phase, and to identify priority action to meet both immediate and delayed needs. In view of this, it is necessary to train and orient officials concerned so as to make the plan realistic and its implementation adaptable to the changing situation and circumstances. Figure-3 shows the changing needs and priorities following floods/sea surges.

Health system at the district level is a critical link in monitoring health status and key risk factors, identifying vulnerable groups, organization and management of local interventions and monitoring and evaluation of their impact. The need to collect information required in handling emergencies

FIGURE-3: CHANGING NEEDS AND PRIORITIES FOLLOWING FLOODS/SEASURGES



effectively is also a reason for the development of a comprehensive health information system at the district level. Such a system is useful for training in surveillance for frontline health workers and village leaders, and village volunteers need to be given clear instructions for reporting. This is one important aspect of an early warning system.

(2) Resource Development and Deployment

During the immediate post-disaster period, health needs of affected population are massive, compared to the locally available resources. Moreover, with disaster impact on local health infrastructure, health care facilities become further limited. Due to imbalance in health need and available resources, it will be necessary for the emergency health operation to prioritize the required action for which necessary orientation will be needed at all levels. Information on existing resources (manpower, material and money and their availability and location) will have to be known in advance. Also, the process of mobilizing resources at short notice from non-affected to affected areas will require advance planning. A list of items to be obtained from donor countries/agencies has to be kept ready to ensure timely availability of appropriate supplies from abroad.

Having assessed personnel requirement in the affected areas, and having identified areas where deployment of manpower is needed, stock of locally-available personnel may be taken. Additional manpower may be pooled from the least or non-affected areas. As it will take considerable time to move personnel from outside, locally available manpower may be deployed in strategic places. Administrative arrangements, especially accommodation, food, water and mobility, besides adequate medical supplies, should be made to provide the basic facility in order to make the medical team more effective.

(3) Coordination, communication and transport facilities

Vertical and horizontal coordination and communication at different levels are necessary for facilitating mutual understanding and cooperation at planning, preparedness, response and rehabilitation stages. Frequent meetings, both formal and informal, would promote effective coordination. Quarterly meetings at the district level and biannual meetings at the national level could help ensure effective implementation of the national plan for disaster preparedness and response. During emergencies, establishment of round-the-clock control room at different levels will facilitate feedback information for proper coordination and response. Breakdown of telecommunication and road transportation are the common phenomena of disaster situation. Advance planning for alternative arrangements for contact between affected areas and the nearest administrative units which coordinate activities of all concerned

departments and agencies will be necessary. After a few days of emergency operation, it will be important to arrange adequate telephone and transport facilities for the health sector, which should be planned appropriately in consultation with other departments/agencies and higher authorities. In the event of a disaster, it becomes essential to coordinate health activities with those of many others, such as local authorities, public utilities, social welfare services, transport services, voluntary workers and outside assistance. Successful coordination depends much on clear information, including clarity of the objective of communication, and on the ability of health personnel to deal intelligently and constructively with the conflicts that are often unavoidable in such a situation.

Telecommunication and transportation are indispensable for effective operations during emergency. In the initial stage, pooling of these facilities amongst various departments and agencies concerned may be necessary. However, as operation progresses, this arrangement is likely to be inadequate. In such a situation, transport for the movement of health personnel and medical supplies will have to be planned separately. Pre-disaster arrangements for such possibilities will be necessary.

Due to the limitation of transport facility during emergency, there will be a need to stock locally the requisite type and quantity of medicines and other supplies. Additional requirements will, however, depend upon the health need, locally-available supplies and transportation facility. Thus, before undertaking the movement of medical stores, the need for such supply must be ascertained in advance. This will avoid overstocking of non-essential items and would ultimately help in economizing medical response operation.

(4) Prepositioning of Medical Supplies

Medical supply management is a critical part of both overall disaster preparedness and effective relief efforts after disaster. Different types of disaster produce different kinds of health impacts, and depending on the nature of the impacts, specific types of medical and other supplies will be needed. It will be necessary to identify the types of supplies needed for different types of disaster. The quantity of medical/amongst the affected population. Initial stocking of such supplies may be made for about 10 per cent of the population in disaster-prone areas. However, depending upon day-to-day monitoring of number of patients seeking medical treatment, further supplementation could be made.

If the disaster is fairly localized and of a slight or moderate impact, medical supplies required for the emergency will tend to be manageable at the local level. If the magnitude is great, large quantities of medical supplies may be needed urgently, and it may be necessary to request assistance from other areas and even from abroad. The specific type and degree of assistance required also depend on the availability of local

/supplies is dependent on the number of persons seeking medical treatment

resources and the level of disaster preparedness prior to the event.

In natural disasters, the most critical medical supply demands are often noticed within the first 48 hours. This initial time period is part of the emergency phase of disaster relief. It is during this phase that the primary problem in medical supply management - the lack of planning-becomes most evident. All too often, a community becomes aware of the value of disaster preparedness planning only after a disaster has struck, while it is attempting to manage the crises in its relief activities. Medical supply management has one primary obligation during an emergency - maintaining control of all available medical and other supplies and their distribution. Most medical supply problems stem from either an inaccurate assessment of disaster needs or the inability to mobilize and control the distribution of available supply inventories. Failure in either area can lead to increased morbidity and mortality and increased operational costs for relief efforts.

Assessment of needs, inventory preparation and control and distribution of medical supplies are sufficiently complex in normal times. In disaster situations, however, they are complicated by a number of factors: lack of access to key individuals; lack of central direction in early phases of relief operations; confusion at all levels during the first chaotic hours; constant changing of priorities; sudden arrival of large quantities of unsolicited and unsorted medical supplies and competition for scarce resources (personnel, space, supplies and equipment). Another complication is the fact that the most critical demand surface immediately after the impact when a medical supply management system is least prepared to cope with unless there has been careful pre-disaster planning.

(5) Activation of Response Mechanism

The activation of emergency operation depends on disaster warning system and information flow from affected areas through mass media or from migrating population. In all circumstances response mechanism has to be put into operation. Simultaneous close monitoring and continuous assessment of the response and situation will be needed.

Mass casualty management has to be planned well in advance to provide appropriate medical treatment on sites and subsequently in hospitals. In this management, three stages may be involved: (a) search, rescue, first aid or near the affected areas; (b) cardiopulmonary resuscitation and stabilization of patients before transportation to medical facilities; and (c) definitive treatment in hospitals.

Emergency response should also cover measures for the control of communicable diseases which include : (a) treatment of patients by mobile and static medical teams; (b) nutritional surveillance, preferably amongst vulnerable groups of population; (c) environmental interventions, i.e. vector control, food

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safety, safe drinking water supply, and sewage and excreta disposal; and (d) hygienic measures in resettlement camps. Disasters create situations congenial for the outbreak of potential epidemics. There has to be a plan for disease surveillance, among other things, to detect the rising pattern of endemic diseases, to detect the appearance of new diseases, to identify sources of diseases and to identify factors responsible for adverse public health problems.

Trained voluntary health workers can be very helpful in first aid, reception of cases at health facilities, lay reporting of diseases and illnesses, and liaison with families and individuals of the affected population.

2.4 TECHNICAL SUPPORT FOR HEALTH SECTOR PREPAREDNESS AND RESPONSE

Health sector (as well as other technical sectors) will need technical guidance and backstopping from time to time to meet the requirements for tackling health-related problems, including unforeseen medical and public health situations. It may be necessary to ensure that expertise is available from different institutions, especially those involved in disease control, epidemiological surveillance, and specialized medical interventions during emergency. In this connection, a technical committee consisting of experts from various disciplines and specialities may be established to closely provide needed advice and guidance to field operation. A rapid assessment protocol should be developed to keep vigil on post-disaster health impact on the affected population. This should involve a team of health and health-related specialists, such as in water supply, sanitation and housing. A specific protocol should also be prepared for assessment of the impact of chemicals on health and environment in case of disasters from such substances.

Operational research and case studies will be helpful to the understanding of health problems created by specific disasters in individual countries, and of possible means and ways to tackle them. National research institutions may be able to help initiate action in this area. Practical research should be carried out on how to apply forecasting strategies used in meteorological sciences and epidemiological surveillance to predict epidemics or to detect them more accurately. New initiatives and innovative programmes should be developed to meet the real physical as well as psychological needs of disaster-affected communities. More research and development are needed in the area of epidemiology of disasters in order to gain a better understanding of situations and events and to apply the available technology more effectively.

2.5 ORIENTATION AND TRAINING FOR DISASTER PREPAREDNESS

At present, the concept of disaster management amongst health as well as non-health managers is tilted more towards disaster response than towards preparedness. As a result, any discussion

on disaster preparedness invariably starts and ends with disaster response. This anomaly may be corrected by organizing orientation programmes for health officials, administrators and managers, mainly to comprehend the relevance and importance of the health sector plan for disaster preparedness and response as well as to understand problems and constraints that may be encountered in the implementation of such a plan. Since these are the people who take important decisions relating to the development and implementation of plans, such as orientation programme will facilitate timely and effective public health assistance to the affected population.

The objectives of the orientation programme at the policy and planning level should be: (a) to develop understanding in planning and management for disaster preparedness and response; (b) to assess national capabilities and capacities to meet emergency situations specific to the countries concerned; (c) to envisage problems that may be encountered in disaster management; (d) to develop a methodology for assessing national need and availability of resources; (e) to formulate contingency plans at different levels of administration, to devise a monitoring mechanism and to prepare for post-disaster evaluation and (f) to facilitate the exchange of information and experience among all concerned departments/agencies and individuals. At the operational/service level, the training should be geared towards hazards assessment, risk analysis, evaluation of health sector capabilities and need, disease detection and surveillance, mass casualty management and hospital disaster plan.

In communities particularly exposed to the risk of disaster, local health personnel should include disaster-preparedness activities in regular health programmes. Regular health education programmes, for example, can also deal with problems of hygiene that arise as a result of disasters. Disaster preparedness activities included in regular programmes should focus on certain population groups, such as school children, workers, associations and groups of volunteers in the community. Information materials should be directed to the needs of the community, and should propose simple measures oriented towards self-reliance which can be implemented locally. Active participation of the community, which is an essential feature of the primary health care approach, should always be applied in orientation activities for disaster preparedness.

Multisectoral and multidisciplinary orientation programme will facilitate mutual understanding of problems and promote efficient and effective coordination and cooperation amongst concerned departments/agencies. Such orientation may be organized at all levels. Simulation exercises (drills) for health and health-related staff, for example, in evacuation, first aid and sanitation measures. Experience gained from these exercises may be used for refinement of the contingency plan. The community should be closely involved in such exercises.

3. COMMON LIMITATIONS OF DISASTER MANAGEMENT

Experience shows that despite a good administrative set-up and a well formulated disaster management plan, disaster mitigation measures may not find the required direction and yield the desired results in the field. Memories of disasters usually fade away after the acute phase of events. Such a tendency is a major deterrent to the development and maintenance of sound disaster preparedness activities. This is the reason for ad hoc responses during emergency/disaster situations. Lessons learnt and experiences gained are lost till disaster strikes again. Furthermore, the tendency for health and health-related managers to respond rather than to prepare leads to ad hoc actions. At the same time, the lack of knowledge and specific skills which usually exist at the operational level, particularly in the field, contribute greatly to the operation being rendered ineffective.

The lack of expertise and experience in disaster management usually manifests in a sense of helplessness among the health authorities, overestimation of logistics without ascertaining available resources, confusion and panic reaction.

In the coordination of disaster preparedness activities, all actions within the sphere of a department and also those with related agencies have to be clearly delineated by assigning responsibility to specific individuals. Informal contact/communication and regular meetings among all concerned departments and agencies and within departments and agencies themselves will greatly facilitate better understanding and promote better coordination and collaboration.

Inadequate knowledge of health consequences of different types of disasters among field workers makes them insecure when exposed to emergency situations. As a result, technical actions hardly have any firm scientific basis. Such situations do not instill confidence either in the minds of the local population or amongst local non-health officials. This is one of the main reasons for the reluctance in giving out correct information about epidemics during disasters. Senior officials are not always present in the field to supervise and guide medical and public health officials in field stations.

At the field level, health personnel usually neglect the importance of resource allocation and management. Even during normal periods medical supplies are insufficient. In case of disaster, these do not meet the needs of the affected population. On the other hand, with hardly any expertise or skill to assess the correct resource need, requests for medical and other supplies are overestimated and inappropriate.

Quick and timely decisions are essential for good disaster management. Rules, regulations and procedures appropriate for use during normal times are often not suitable for emergency situations. The inability or the lack of will to simplify such

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rules, regulations and procedures, particularly for facilitating the efficient implementation of disaster management plan, is a common handicap. The delegation of administrative and financial authority to the lowest level of health administration delays timely action during emergency situations. When there is a breakdown of communication with the higher levels, it becomes difficult to obtain necessary instructions resulting in delays and disorder.

National and international solidarity is certainly of great importance for disaster-stricken communities. It may happen, however, that assistance from outside is more in line with the idea that donors have formed of the disaster, or with what they have at their disposal than with real local requirements. Thus, certain forms of inappropriate assistance crop up again and again due to the lack of quick and correct assessment, and inability to coordinate external assistance. Inappropriate external relief supplies may also overload storage and movement capacity, and overtax limited personnel time which could be usefully devoted to other needs.

DISASTER PREPAREDNESS AND RESPONSE

Dr Bruce Dick*
Dr Olavi Elo**

INTRODUCTION

Most governments of countries in the developing world are struggling to cope with the health problems that confront them daily. This is particularly true of the often overwhelming health problems of vulnerable groups and communities. Ironically, these are often the very communities who are most severely affected by disaster, both because they are vulnerable and also because their capacity to respond is usually weak.

Because resources for health are limited and already overstretched, it is unlikely that governments will be able to set up systems at local level for responding to disasters which are different from those which they have in place for responding to the routine needs of such communities. This applies similarly to those non-governmental organizations who also direct their work to improve and maintain the health of vulnerable communities. If the resources that are used for responding to disasters are to contribute to sustainable development, and not merely 'fire-fight' during the crises, they will need to work through and strengthen the existing structures, and be guided by the same philosophy and strategy, namely primary health Care.

Response to disasters - a part of primary health care

The response to a disaster has to be a part of the primary health care system. Although a vertical approach may be needed at national or regional level, in the district an integrated response is essential, which builds on the existing strengths, the collaboration between sectors, the involvement of the community and the resources of people and services. Thus the system which has to deal with daily individual disasters is strengthened through getting prepared for major community disasters.

In addition, the priority health problems which follow in the wake of many disasters such as diarrhoea, acute respiratory infections, vaccine-preventable diseases, and malaria, and the groups usually most seriously affected by disasters, for example the poor, the isolated, women and children are, or should be, a priority focus for the routine health services.

This article will focus mainly on the health sector at District level. However, it needs to be emphasized that district level

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disaster preparedness and response must be seen within the context of national disaster plans, and that the health sector is only one of the many sectors that will have an important role of play in planning for and responding to disasters.

BASIC PRINCIPLES AT THE DISTRICT LEVEL

Preparing for and responding to disasters is really no different from preparing for and responding to any other type of health problem:

HEALTH PROBLEMS IN A DISASTER

- * What are the important problems ?
- * What are the urgent needs ?
- * What solutions could be effective ?
- * What can be done in practice ?

Recognize that events are unpredictable

In addition to the normal problems associated with planning and responding to health priorities, an element of chance exists in disasters, which makes planning more difficult (although chance probably also interferes more often than we care to recognize in our non-disaster planning !) Disasters are usually unpredictable and since there is a need for rapid action, decisions have to be taken quickly bearing in mind that with many disasters there is probably less of an 'emergency' than the common misconceptions would lead us to believe. Anything that can help minimize the impact of chance (eg. early warning systems, hazard mapping or which facilitates a rapid and appropriate response at a time when there is often a great deal of political, media and other pressure for immediate action (irrespective of whether or not it is really necessary or appropriate), will help to ensure that the priority problems caused by disasters are met.

Learn from the Experience of the Past

In preparing for disasters, we must learn from the past in order to define priorities and make sure that essentials are dealt with first. What works - what does not work ? What lessons can a previous disaster give ? Why was one response successful and another a failure ? What were the main health problems and which was most seriously affected by previous disasters ? In general, specific disasters, whether acute such as floods or earthquake or slow moving such as refugees or famine, cause fairly consistent health problems during the rescue, relief and rehabilitation phases. Of course the problems will differ depending on for example, the severity of the disaster agent, the time of day, the season, the population density, the particular groups affected.

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the access, the existing health infrastructure, the international appeal and the political milieu. Nevertheless, the priority needs and the main approaches to meeting these needs remain fairly constant for different disasters and these need to be understood if responses to disasters are to be efficient and effective.

Build on the Strengths of the Community

Just as good primary health care involves the community and its many and varied resources, so does an effective response to a disaster. It is the affected families and communities who respond initially, organizing themselves after a hurricane, scavenging for famine foods after a drought, and moving rubble to find relatives and friends after an earthquake. The people who are most frequently affected by disasters are generally accustomed to fending for themselves. Vulnerable communities have learned their own strategies for survival - strengthen these: their own methods to cope - support these: and have their own priorities - respect these.

Identify the most vulnerable Get help to those most in need
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Identify the most vulnerable

In any disaster some groups and individuals will be more seriously affected than others. These groups need to be identified, both before any disaster strikes, when the community is getting pre-prepared, and while the effects of the disaster are being initially assessed. Ensure that those most in need benefit from the relief activities. Make a special effort to identify such groups when monitoring and evaluating relief programmes.

Mobilize existing resources immediately

The response to disasters will, for the most part, rely on the people who are responsible for meeting the daily health needs of the affected community (although of course, additional resources from outside will frequently be necessary). This applies both to the community and to the health workers. A foreign team which is flown into a disaster affected area is often quite inappropriate they arrive too late, are often unable to work under the difficult conditions, do not speak the language and may rapidly exacerbate the problem rather than help alleviate it. Of course, external assistance is frequently required following disasters, but this assistance must be appropriate both to the needs and to the local conditions, in terms of people, food, medicines and other resources. But donors must be educated and their skills in

assessing the initial and the real needs, must be developed.

Finally, the importance of working with other organizations and with other sectors needs to be emphasized. Anecdotes about 'agency anarchy' are still common and this needs to be prevented at all costs. It will require strong leadership and clear system of coordination in preparedness planning, response and rehabilitation, so that the different sectors, such as health, transport and communications, public works, the media and agriculture all work together.

Information and training are very important in disaster preparedness and response. First, the information that is really needed must answer priority questions. Second, it is important to clarify how accurate the data need to be in order to answer the questions in an adequate but not too detailed way. Data may be collected routinely or during special surveys using rapid assessment techniques.

PRINCIPLES OF DISASTER PREPAREDNESS

There is nothing particularly special about disaster preparedness. It is simply an attempt to take account of the elements of chance and speed of response that set planning for disasters apart from other planning activities.

Is there a national plan ?

First find out if there is a national disaster preparedness plan and if so, what responsibilities are envisaged for the health sector at district level. It is important to be clear about the responsibilities of other tiers within the health service and other sectors, in order to identify opportunities for improved collaboration and joint planning. The political will and resources to develop national disaster plans may be given a boost during the International Decade for Natural Disaster Reduction, particularly in those countries which are so busy responding to disasters that they do not have the time to develop an effective national plan!-

Are responsibilities clearly defined ?

Clear definition of who is to be responsible for what in a disaster is essential for effective response. However, in some countries the national disaster plan may not yet have moved from paper to action. This places extra responsibilities on the health staff at district level both to advocate for a realistic and achievable plan, and also to identify local activities that can be carried out despite the absence of an overall plan.

Is Communication well defined ?

In addition to improving coordination and cooperation, within the health sector and with other sectors, it is also important to develop good communication links with the media before disaster. In this way it may be possible to use the media as

a channel for providing clear and accurate information, both to affected people and also to the 'world outside'. Thus the media can help to strengthen and assist the response rather than hamper it, which is sometimes the case. Since 'donor education' is an important aspect of disaster preparedness, the media should be involved with this and help to avoid pressures for unrealistic or inappropriate action.

What can be predicted from past experience ?

For some people the response to disaster will always be too little too late, and no amount of preparation can ensure that the health sector is prepared for all eventualities. However, it will often be possible to identify the likely disasters in a given district, when and where they are likely to occur, and what their impact might be on the surrounding population. This is known as hazard mapping and is an important first step in planning for disasters.

An analysis of the response to, and impact of past disasters in the district can provide invaluable information about priority health and nutrition needs, the main problems encountered, and strategies that are likely to work in reality as well as on paper. A number of non-governmental organizations, governments and inter-governmental organizations have produced publications which build on their 'institutional memory' of responding to disasters, and outline an approach to meeting the priority needs of disaster-affected communities.

How Can the Community be encouraged to Respond ?

One issue that is emphasized in many of these publications is the need to develop good contact with the community. In most disasters it is the affected communities themselves who are the first to respond during the relief phase. It will also be the community who is left with the rehabilitation phase, when most of the external interest and enthusiasm has moved on. Every effort should be made to generate and sustain the commitment of community leaders - therefore improve two-way communication with the community, involve them in the planning, and strengthen their capacity to respond following the disaster.

Get Community leaders committed

- *Communicate with them
- *Do planning with them
- *Strengthen capacity to respond

What early warning systems exist ?

Adequate information for early warning and planning the response are clearly essential. This will require a review of the data which are routinely collected at district level and, in addition, staff must be trained to carry out rapid assessments to identify the priority physical, psychological and social needs

of affected communities - techniques which are in any event useful to them in their daily non-disaster work. Take epidemiology as an example - data are routinely collected from health facilities but, when they show a change of pattern, more detailed and specific information is collected which enables an appropriate response.

Use Disaster Preparedness to Strengthen District Services

After deciding what needs to be done and how it is going to be carried out, train the staff who will be responding and ensure that the material resources necessary are available. Such training can be done as part of routine training of health staff. Guidelines will be needed on triage and essential emergency drugs and on ways to link with existing national programmes that focus on immunization (EPI), diarrhoeal disease control (CDD) and nutrition, or other relevant matters.

In general, disaster preparedness should be seen as an opportunity to strengthen what the health sector is already trying to do, and to develop the skills and orientation needed for responding to the non-disaster needs of vulnerable communities. There may even be opportunities to re-examine or change existing programmes

<p>Preparedness for Disaster - an opportunity to Strengthen skills of health workers</p>
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A good example of this is 'first aid'. Within the Red Cross/Red Crescent, much first-aid training in developing countries has been modelled on training programmes that were developed in Europe or North America. While this traditional first aid has a role to play, the health problems addressed are not always those which are most important following disasters in developing countries. As well as broken bones and haemorrhage, it is essential to include basic information about home management and prevention of common diseases. In this way, first aid can focus on disaster health priorities and daily health priorities which are for the most part one and the same thing.

DISASTER PREPAREDNESS AT DISTRICT LEVEL

<p>The first 24-48 hours are decisive for victims of sudden onset disasters such as earthquakes or technological disasters</p>
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The most important decisions for effective disaster response are taken at local level, in the district. A national disaster

preparedness plan is important as are communication with, or external help from, outside the district. However, any significant intervention immediately after an acute disaster has to be local. It is the first 24-48 hours that are decisive in rescuing the victims of sudden onset disasters such as earthquakes or technological disasters. It will be one or two days before help from abroad arrives.

Even if help from within the country arrives within this period, its effect will be reduced if district and local disaster management is not organized. The same is true in the case of slowly emerging disasters such as drought and famine, although these allow much more time for decisions and action.

National disaster preparedness plans for health must also involve other sectors. The same applies to the district where police, labour union, agricultural cooperatives and other community organizations may have important roles to play. In addition, within the health sector at district level, all health facilities, institutions, hospitals, health training schools, etc., have to be brought into a health sector plan, and each of these units will have to have their own plans, coordinated by the district health authority. The responsibilities have to be clearly spelled out, and 'rules of conduct' established. Red Cross/Red Crescent Societies and other NGOs have important capacities at district and local level, and these need to be tapped.

The Fundamentals -

- *Prepare the community
- *Train all sorts of people
- *Ensure that they are ready

Last but not least, the local community is the key player in disaster preparedness and response. If people know what to do in a disaster much of the chaos can be avoided and lives saved. Training and educational programmes in schools, to the general public through the media and in other ways, should be part of any district disaster preparedness.

PREPARING A COMMUNITY PROFILE

A community profile, established before a disaster, is an essential part of district preparedness. When preparing such a profile you should consider the following information, although the amount of detail that is possible will vary depending on the available resources :

- * map of the area and boundaries
- * population by village and age groups
(high risk/vulnerable groups)

- * socio-economic characteristics
- * Hazard/vulnerability analyses
- * risk/hazard mapping
- * history of disaster
- * community resources (shelters-vulnerability)
- * health system organization/structure: resources (personnel, facilities, vulnerability analyses) health information water source and distribution system

DISTRICT HEALTH PLAN DEVELOPMENT

While developing the district disaster health plan, there are several phases to consider, such as preparedness, warning, response, and recovery/rehabilitation.

Preparedness

Preparedness is a continuous activity, and in this phase the major activities are :

- * education/training of health personnel with particular reference to resuscitation and life maintenance procedures and techniques
- * education/training of community members in first aid and rescue
- * collaboration with other key response sectors. (District Disaster Preparedness Committee)
- * development of plans and procedures
- * procurement of essential supplies and equipment
- * inventory of resources
- * simulation exercises and drills

Warning

The focus is on :

- * dissemination of information on situation and also to remind community of safety measures to be taken
- * review of emergency procedures and action plans
- * ensuring that systems planned for are in place and in working order
- * supervision of evacuation to shelters

Response

The emphasis is on :

- *management of casualties
- *evaluation/referrals
- *assessment of immediate damage/needs
- *health care in shelters
- *collection and dissemination of information
- *monitoring of environmental health
- *epidemiological surveillance
- *public health information/education
- *emotional/psychological support

Recovery

The emphasis is on:

- *restoration of normal health (primary care) systems
- *needs/damage assessment
- *rehabilitation of health facilities and services.

THE DISTRICT HEALTH PLAN

The district health disaster plan itself should contain the following programme areas :

Health Care :

- *management of mass casualties
- *continued management of common acute and chronic conditions
- *hypertension, diabetes, asthma, epilepsy (and contraceptives)
- *maternal, paediatric and other emergencies
- *medical / surgical emergencies
- *emotional/psychological counselling

Environmental health and safety including vector control:

The priorities are :

- *damage/needs assessment

- *ensuring and monitoring the water supply for acceptable levels of quality and quantity
- *ensuring the level of solid and wastewater disposal is adequate to avoid the risk of disease transmission from pre-disaster levels.
- *community public health information/education
- *shelter management (health care, environmental health, epidemiological surveillance)

Control of communicable disease :

Knowledge of morbidity and mortality pattern (statistical data) in the district is a useful guide for recognizing unusual disease patterns. Routine health information also serves as a guide in estimating the number of persons who may need health care.

Epidemiological Surveillance :

*Monitor daily

the health status of individuals in shelters particularly in the community in general the sanitary conditions

*Report daily in daily format

*Be alert for gastroenteritis in infants, ARI, infectious skin conditions particularly scabies

*Any other disease which may be endemic to the district such as malaria.

Food and Nutrition:

In sudden impact disasters when severe shortage of food is not anticipated, the distribution and transportation systems may be disrupted. Priorities :

*evaluation of available stocks

*equitable distribution of food supplies to those in need

*food inspection

*community education eg. food preservation, storage

*prevention of food poisoning

*monitoring the nutritional status of vulnerable groups, eg. pregnant and lactating women, infants and young children and the elderly.

Public Health Information/Education Supply Management :

Monitor levels of stores and identify items which are used often - reorder as appropriate

Communication :

Identify communication mechanisms within each health facility; in districts between other health facilities in the district :

*with community members

*with other agencies including NGOs in the district.

*with Ministry of Health

*annex list of alternate communication systems, eg. police radio, commercial or voluntary organizations.

Transportation:

*Identify vehicles/methods currently in use by district health team

*Identify and annex list of owners of other vehicles which could be used if necessary, eg. buses, private cars, boats, bicycles, lorries

*Identify helicopter landing sites

In many districts, given the limitations of time, money, people and other resources, it is unlikely that it will be possible to prepare a community profile in such detail. What is important, however, is that the district health team obtains enough information and prepares itself and its community adequately to respond to the likely impact of the likely disasters in the district. The process of carrying out a community profile should help educate and motivate.

The response to disaster can only be timely and effective if people are prepared. Preparedness should build on and strengthen the everyday response by the health team to the daily 'disasters', those priority diseases which are usually much the same in disaster or daily work.

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SHOULD DISASTER STRIKE-BE PREPARED!

WORLD HEALTH DAY-7 April 1991
BACKGROUNDER

Each year many places on earth are struck by floods, storms, landslides, forest fires, earthquakes, volcano eruptions, epidemics, famines and wars which affect the human life. Besides, there are other modern disasters caused by man as a result of rapid industrialisation and urbanisation like pollution of air, water and soil. Together, they still afflict the world, carrying alongwith them horrifying tales of death, damage, and destruction.

It was in this context that the World Health Organization (WHO) has decided to devote the World Health Day-7 April, 1991 to Disaster Preparedness and the slogan selected for the Day is:

SHOULD DISASTER STRIKE-BE PREPARED!

The theme reflects the need for creating awareness of the great damage to human health that can be caused by natural and man-made disasters. Modern technology and scientific progress has made it possible to predict disasters which calls for appropriate attention and actions required for preparedness to mitigate devastating effects of disasters.

What is a disaster ?

WHO defines disasters as situations of unforeseen, serious and immediate threat to public health and disruption of human ecology. A disaster occurs like an explosive epidemic affecting masses and usually culminates into undue loss of life and/or property. It is always associated with mass panic and usually large scale movement of population which disrupts the normal social life including administrative organization of the community effected. Such a stressful situation imposes a sudden demand on the public health machinery for which it is not usually fully prepared. The consequences of such unpreparedness are reflected by an increase in the amount of morbidity, mortality and disability which the community suffers. It also leads to unplanned expenditure and efforts which could be minimised if the health services are ready to take action on the basis of a plan prepared in advance.

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Disasters can be broadly categorised as:-

- Natural disasters such as earthquakes, cyclones, floods, sea surges, famines, droughts, epidemics, etc.
- Man-made disasters which may include wars, pollutions, chemical disasters, etc.

High mortality and morbidity

Tropical cyclones viz., hurricanes, typhoons and other wind related disasters cause an yearly damage on an average of Rs. 30 crores to the environment, property, livestock and agriculture and an annual death toll which may reach, 30,000. Drought is still causing enormous damage, particularly in Asia threatening the lives of millions of people. Such disasters are also a severe strain on the fragile economies of many developing countries. It has been estimated that over the past twenty years three million people have lost their lives and another 1000 million have had their lives badly disrupted due to natural disasters all over the world.

The Bhopal gas tragedy bears ample testimony to the fact that manmade disasters even if they take place within an industrial unit, unless promptly contained and controlled, have the potential to inflict irreparable damage to public health and the eco-system outside the site of the disaster.

Earthquakes: Earthquakes kill on an average 15,000 people a year worldwide and are not impartial in whom they kill and maim. Most earthquakes damage is in cities, towns and villages, not in the countryside. In builtup areas, one finds greater population concentrations, as well as the problem of collapsing structures. Earthquakes also kill more people at night than during the day, because more people are inside the homes at nights. Severe injuries, specially spinal injuries and pelvic fractures are common. There is an increased risk of infection as exposure by shelterless victims remains a potential problem.

During high winds, few deaths occur. Severe injuries are moderate. Food scarcity is commonly seen and population movements are rare. Hurricanes usually leave behind a significant number of persons with physical disabilities such as spinal cord lesions, blindness and deafness.

During tidal wave and flash floods, many deaths occur although severe injuries are few. Food scarcity and population movements are common. Potential increased risk of infections is present.

During floods, deaths and severe injuries are few. Food scarcity and population movements are common. Potential risk of infectious diseases is always present.

Besides above, the victims of any disaster are also prone to suffer from a variety of psychological disorders, such as,

(i) Various forms of anxiety, depression in predisposed individuals, and (ii) post-disaster syndrome (temporary confusions, disorientation).

Increased risk of communicable diseases remains a potential risk following natural disasters which result into overcrowding and deterioration in environmental hygiene particularly affecting the water supply and disposal of human wastes. This again depends largely on the previous sanitary levels of that area. Sometimes shortage rather than contamination of water supply emerges as a major problem.

During famines, prolonged malnutrition predisposes to gastroenteritis, measles and respiratory group of infections which become leading causes of death.

Disasters also disrupt the ongoing disease control programmes in the area.

Besides the above problems, burial/cremation of corpses and disposal of carcasses are other major problems to be tackled with on a war-footing.

Chemical accidents and their health hazards

Bhopal gas tragedy and Chernobyl nuclear disaster have highlighted the risks of chemical accidents. Chemical accidents, though avoidable, are inherent to the hazardous nature of chemical industries. Apart from accidental releases during production, even storage and transport of certain chemicals are intensely hazardous operations. Both life system and environment are the targets. We have today enough knowledge about the acute effects of these chemicals, but we have very limited understanding of their long-term health effects. Phosgene, a highly toxic industrial chemical, was inhumanly used as a war gas in World War I. Its long-term effects on the soldiers who survived became evident only 30-40 years after exposure in 1914-15.

The pollutants released in massive quantities induce adverse effects directly or after absorption and transformation within the lung. The net result is an overall toxic stress which ends up in respiratory failure and death and permanent injury to the respiratory system of many survivors. The long-term effects include functional disturbances or inadequacy of performance of vital organs and general disability. Infections of the upper respiratory tract are exacerbated. The respiratory organs also become more susceptible to infections and allergenic activation.

Effects on the eyes are a temporary or partial loss of vision and more particularly premature cataract formation. In many such premature cataract cases, it may be necessary to resort to corneal transplantation. The most serious injury to the skin in chemical exposures is a first degree burn, acne or prolonged sensitization reactions.

Other systemic effects of absorption of intensively toxic chemical through the lungs are noticeable in the blood forming processes and in functions of the liver and kidney. Abortion can be induced in pregnant women. Structural malformative changes could be noticed.

Examples of some disasters

A few examples of disasters which are still fresh in the memory of living generations are as under:-

(A) Atom Bombing of Hiroshima (6 August 1945) and Nagasaki (9 August 1945) during the second world war is regarded as the worst manmade disaster of the century with estimated casualties of 120,000 and 75,000 respectively.

(B) Guatemala Earthquake (1976) in which 92% lost their homes, about 76,000 sustained injuries and some 23,000 got killed. A sample survey of victims of this disaster brought out such startling findings as-

- 84% of the victims had no social security in the form of insurance.
- 46% were dissatisfied with the medical care received by them.
- 13% could not return to their former employment because of their injury, i.e., they needed vocational rehabilitation.
- 12% had to wait 2-3 days and 16% for one week before admission into a hospital.
- Even for first-aid, 13% had to wait for 2-4 hours, 12% for 4.8 hours and 21% for 2-3 days.

Earthquakes in 1990 of Peru, Iran and Philippines

On 29 May 1990, an earthquake spread panic in the inhabitants of San Martin in the North Central Region of Peru. More than 120 people died and about 40,000 were affected. Twenty per cent of the dwellings were destroyed affecting the poorest.

On 21 June, 1990, a major earthquake struck the provinces of Gilan and Zanzan in the Elburz mountains of North Western Iran. Nearly 40,000 people were dead, 60,000 injured and 500,000 became homeless. At many places 60 to 90 per cent of the homes were destroyed or suffered major damage.

On 16 July 1990, another major earthquake struck Central and Northern Luzon areas of Philippines. Eight provinces and three cities were devastated with 1000 people killed, over 100,000 houses and buildings destroyed rendering 2,00,000 families homeless and large numbers either injured or missing.

(C) The Tidal Wave And Cyclone Disaster in Andhra Pradesh (1977) claimed some 25,000 lives. The victims included mainly young people, the old and the weak.

(D) Bhopal Gas Tragedy (1984) is regarded as the worst air pollution disaster so far and was due to accidental leakage of methyl isocyanate (MIC) from its plant. It affected about two lakh people and claimed 1,754 lives, according to one published report.

(E) Chernobyl Nuclear Plant Disaster (1986) resulted in the death of 28 people and 203 suffered from radiation sickness. The material losses amount to two billion roubles approximately.

Should Disaster Strike: Be Prepared!

Emergency situations like war, earthquake, flood or any other natural or man-made disasters can upset arrangements of the community, municipality or Panchayat for the prompt and sanitary disposal of community wastes, supply of safe drinking water: curative and preventive health services, etc.

These may give rise to diseases which we cannot risk in an emergency situation. Here are a few suggestions for your guidance in such a situation:

- *Use less water for all purposes to minimise the quantity of wastes. Also minimise the solid wastes.
- *Always use a sanitary latrine, as it will stop flies from coming into contact with stools and thus prevent spreading diseases like cholera, typhoid, dysentery, etc.,
- *Utilise the waste water from kitchen, bathroom, etc., for gardening inside the compound or divert it into deep pit for sub-soil dispersion during an emergency.
- *Collect all the solid wastes from the house and bury them away from the house.
- *Always keep your garbage tin or can covered.
- *In case of disruption of water supply, boil water for drinking purposes. If water is taken from a river, filter it before using so as to avoid diseases such as guineaworm. Water from ponds, lakes, etc, must be strained through two layers of cloth and allow it to stand for a short while. The water can then be purified by boiling or by using bleaching powder.
- *Private or community owned water sources should be protected from outside contamination. The same applies to domestic containers and should be kept covered.
- *Get yourself and your family members immunized against diseases as it is the best form of preventive medicine. Immunization is especially a practical step in preparing for disaster situations because it can be taken in advance.

Emergency situations we may face

- * When a disaster strikes many lives are lost. People are also seriously injured. They may need blood to save their lives. In such a situation you can help by donating your blood. Human blood has no other substitute.
- * Person or persons receiving injuries during a disaster may be in a state of shock. They may have serious bleeding which must be stopped urgently. Fractures also result due to injuries.
- * We may get burnt by fires and heat as well as scalded by hot or boiling liquids like water and oils.

Learn First-Aid

We must learn something about first-aid to help the victims of disaster. Very simple hints about care during emergencies and before the patients are provided specialised medical services, can help save many lives. A few hints to control situations mentioned above are:

* A patient in a state of shock should be laid on his back. His head should be low and turned to one side, and his feet raised. In case the patient has a head or a chest injury, the head and shoulders should be raised and supported. Loosen tight clothing. He should be kept warm by blankets. Liquids must never be given if the person is unconscious or in a severe shock or has abdominal injury, or is likely to be operated upon within 3 to 4 hours.

* In case of bleeding, keep the patient lying down. Raise the bleeding part. Stop the flow of blood immediately by applying pressure directly over the wound with a sterile gauze or clean cloth or your thumb. Apply dressing of suitable size and pad over the wound and press them firmly in position. Remove him to a hospital as early as possible keeping his head slightly lower.

* A man may die in few minutes if his breathing stops. He needs help in breathing when breathing movements stop or his lips turn blue and finger nails become blue. Give him artificial respiration. Mouth-to-mouth respiration is best.

* If a person catches fire ask him to roll on ground or cover him with a thick cloth or blanket and ask him to roll on ground. Stop him from running when his clothes are on fire. Move him to a hospital immediately.

* Fracture is a break or crack in a bone. In case of fracture the patient should not be moved until the injured part has been immobilized (preventing from moving). Bleeding, if any, must be stopped before attending to a fracture. Make the patient warm.

and comfortable and keep the injured part steady and properly supported. Bandages should not be very tight and should not be applied over the sight of the fracture but above and below the site of the fracture.

* Transport the patient soon after first-aid to a hospital. Use a hard stretcher if there is a fracture of the spine.

A few more hints to face a disaster

* Decide in advance where will be the safest place in case of a disaster in your house as well as the place of work, keeping in mind the nature of disasters.

* Flashlights such as torches, etc., should always be kept to reserve for an emergency created by electricity failure. Candles, lanterns, lamps may also be used, but it must be ensured that there is definitely no danger of explosion.

* In case disaster strikes we may need certain basic tools such as a shovel, axe, hammer, a saw, a crowbar, etc. There may be useful to move debris under which someone is trapped.

* A first-aid medicine box to be kept ready for emergency use.

* A transistorised radio should be on hand and its batteries kept fresh. The radio may be the only means of communication with the outside world for hours or even days.

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ACTION PLAN FOR MANAGEMENT OF EARTHQUAKE

In our State only vulnerable areas at present are Khardi village in Thane district and Koyna Nagar in Satara District. At both these places, threat of earthquake is due to construction of irrigation dams.

Usual cause of death after earthquake is house collapses. The deaths sometimes exceed more than 10 percent of the population and in addition injure large number of people. The death toll in an earthquake mostly depends upon three factors.

1. Type of housing - Home Houses built of bricks and stones even if only single story high are unstable and therefore cause many deaths and injuries. Lighter forms of construction especially wood framing have proved much less dangerous.
2. Timing of the day at which an earthquake occurs. If earthquake occurs at night, death toll is more than if it occurs during day time.
3. Population density - Total number of deaths and injuries are much more in densely populated areas. The ratio of death to injury after an earthquake is 1 to 3 when they result from the primary shock.

Secondary disaster like fires may occur after earthquake and increases the number of casualties.

Pattern of injuries during earthquake :-

- a. Most of the persons are injured with minor cuts and bruises
- b. A smaller group suffers from simple fractures
- c. Another smaller group with serious multiple fractures or internal injuries requiring surgery and other intensive treatment
- d. Most of the demand for health services occurs during first 24 hrs. The injured people may appear at medical institutions only during first 3 to 5 days after which presentation patterns return almost to normal.
- e. Patients may appear in two waves.

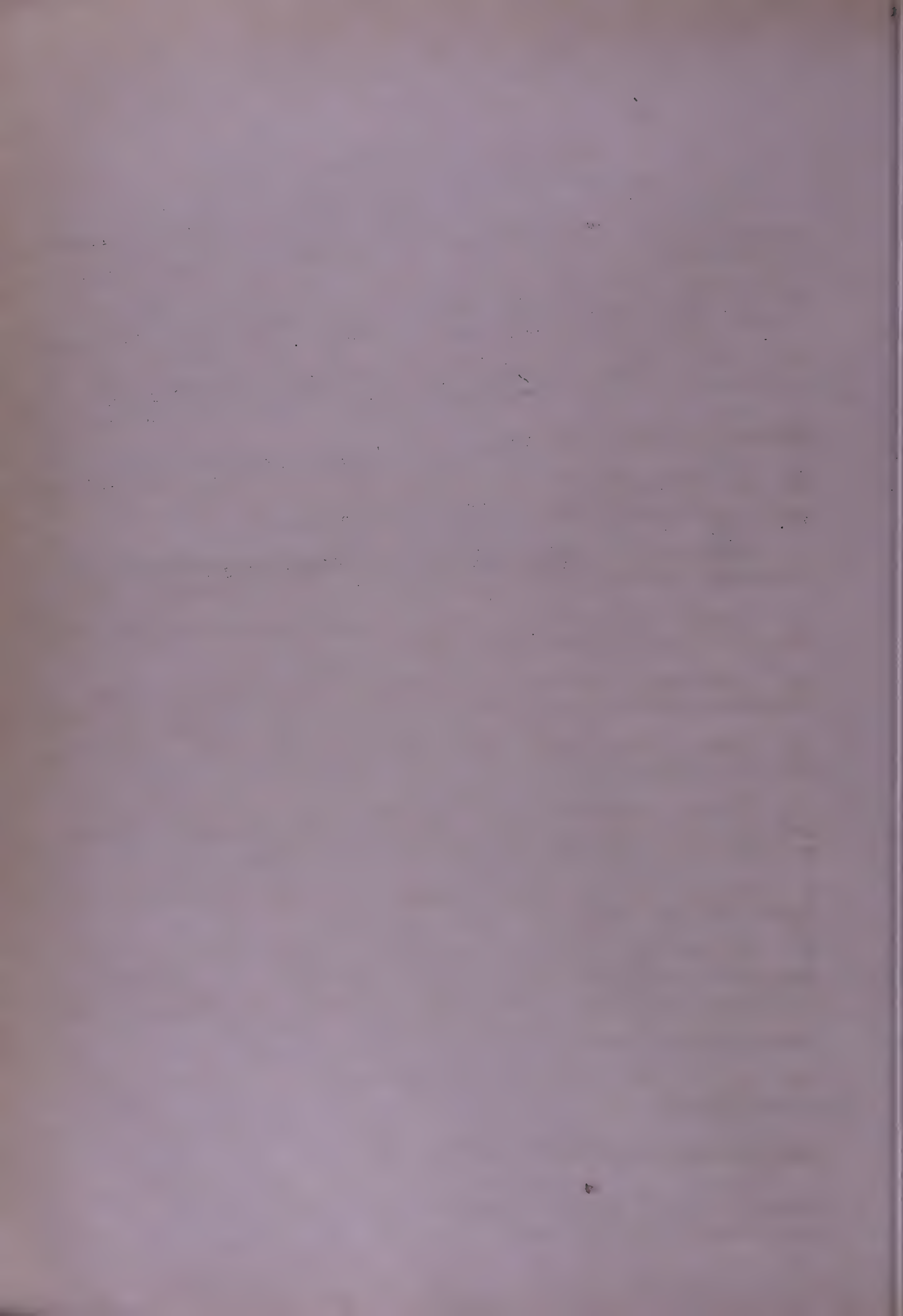
- i. First consisting of casualties from the immediate areas around the medical institutions
- ii. References sent from the out-station areas when the relief operations get more organised.

ACTION PLAN TO MEET THE THREAT OF EARTHQUAKE

1. Identify the villages and areas which are likely to be affected by earthquake
2. In earthquake prone areas, buildings with light weight structures, may be constructed to minimise the casualties
3. Train large number of volunteers in first aid in every village
4. Keep large stock of first aid and other materials in earthquake prone areas some equipments and materials are required in large number - example :
 - a. Stretchers
 - b. Splints
 - c. Emergency light
 - d. Torches
 - e. Plaster of Paris etc.
5. Ensure availability of a fleet of buses from State Transport at a short notice for transporting casualties
6. In earthquake the major cases are of fractures for which Orthopaedic Surgeon and an anaesthetist are required for treating the patients. They should be available in large numbers.
7. On getting advance warnings, it is necessary to have petrolling during night by groups of volunteers so that in any eventuality, immediate first aid is made available and the confusions and chaos at night are avoided.
8. An ambulance preferably a ROME vehicle should be stationed at vulnerable places for rendering immediate aid.
9. It should be ensured that medical institutions or temporary wards where patients are to be shifted are constructed of light materials like tents, or light weight structures so that they themselves would not cause casualties.
10. As normally electricity fails, for emergency light, small generators of 1.5 kv to 7.5 kv. should be made available in large numbers.

-3-

11. For making announcements and giving confidence to the people public address equipment should be made available.
12. Bandage and cotton in large quantities should be kept ready
13. Helipad should be made available to rush the patients to referral centres whenever necessary.
14. To have good communication, wireless sets should be installed in the vulnerable areas as well as the base hospital.
15. It is essential to have a rehearsal drill of the staff periodically.
16. Fire extinguishers should be kept ready
17. Daily report giving position of preparedness to meet the threat may be submitted



ACTION PLAN FOR MANAGEMENT OF FLOODS

The occurrence of flood in our country is almost an yearly phenomenon. Very often, the onset of the flood is sudden and severe enough to out balance the existing arrangements, causing sufferings to the affected population. It is therefore of utmost importance that we remain always in the state of preparedness in close co-operation and co-ordination with other departments and organizations so that there is no delay in relief measures. Following is the action plan to meet the threat of flood for district.

Preflood Preparedness :

1. Prepare the list of villages which are likely to be affected and also vulnerable to the floods from the past experience along with population.
2. Prepare the list of medical institutions such as PHC, Rural and Cottage Hospitals, etc., in the vulnerable areas.
3. Number of teams of medical officers and para medical staff should be formed and kept ready.
4. Meet the district level officers connected with flood management atleast one month before onset of monsoon every year.
5. Ensure that proper control room with telephone or wireless set is available
7. Ensure that during flood season there will be no transfer and the vacancies are filled and nobody would be allowed to leave post unless substitute is available.
8. Ensure that local health staff and other are trained in rescue relief and first aid.
9. Ensure that proper sanitary arrangements are made at possible evacuation camps viz., construction of deeptrench latrines, temporary urinals with soakage pits, and arrangements for burning dry refuse. Latrines should be separate for male/female and children.
10. All the wells in the villages should be dis-infected prior to monsoon,

Action During and After Flood :

1. Main responsibility will be to treat the casualties arising out of flood. Detailed instructions about treating the casualties have already been given

2. To take anti epidemic measures -

- a. Detection of the cases and finding out whether incidence of fever, diarrahoea, jaundice etc., is usually high ?
- b. Take routine anti-epidemic measures like water disinfection, anti-cholera inoculations, isolation and treatment of cases, anti-fly measures etc.
- c. First aid kits consisting of splints (including thomases splints) Tornique, dressings and assorted bandages, antiseptic cream, scissors and safety pins etc. to be kept in every flood prone village.
- d. Drugs - Anti - Diarrhoeals, antibiotics, chemo-therapeutics and anti-malarial drugs, anti-pyretics, analgesics and antiallerggic drugs, cholrosal, I.V. fluids, paediatric formulations for treatment of gastro intestinal and respiratory infection in the children.
- e. Constant liasion is to be kept with Revenue, PFD and police to get information of flood.
- f. Disaster management units to be kept ready at distric hospitals
- g. Information should be sent daily from district to regional and State level control rooms

TABLE - 1 : BASIC UNIT (for 1000 persons for 3 months)

(The New Emergency Health Kit)

DRUGS :

Acetylsalicylic acid, tab 300 mg	3000
Aluminium hydroxide, tab 500 mg	1000
Benzyl benzoate, lotion 25%, bottle 1 litre	1
Chlorhexidine (5%), bottle 1 litre	1
Chloroquine, tab 150 mg base	2000
Ferrous Sulphate + Folic Acid, tab 200 + 0.25 mg	2000
Gentian violet, powder, 25 g	4
Mebendazole, tab 100 mg	500
ORS (oral rehydration salts), sachet for 1 litre	200
Paracetamol, tab 100 mg	100
Sulfamethoxazole + Trimethoprim, tab 400 + 80 mg	2000
Tetracycline eye ointment 1%, tube 5 g	50

RENEWABLE SUPPLIES :

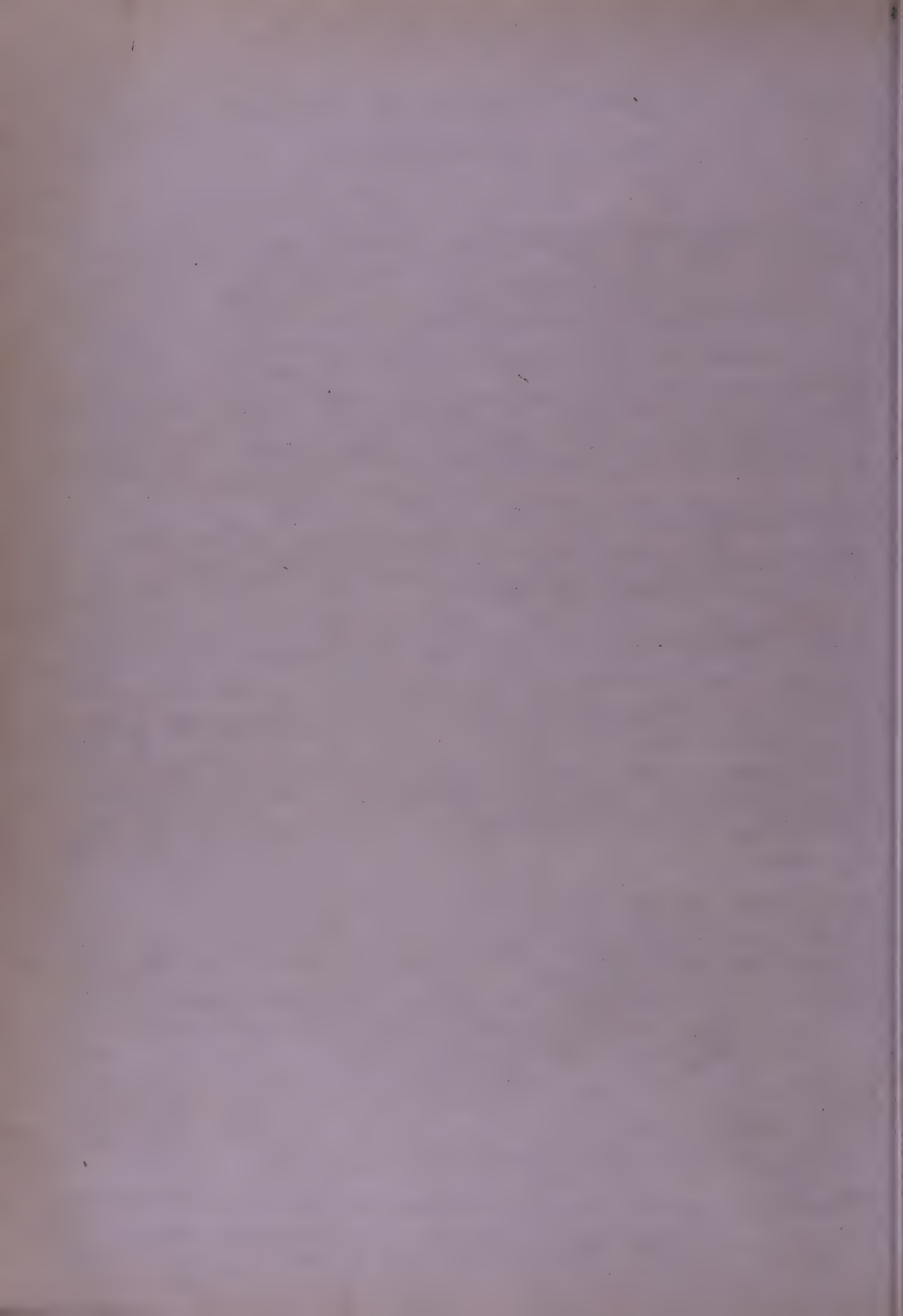
Absorbent cotton wool, kg.	1
Adhesive tape 2.5 cm x 4 m, roll	30
Bar of Soap (100-200 g), bar	10
Elastic bandage (crepe) 7.5 cm x 10 m, roll	20
Gauze bandage 7.5 cm x 10 m, roll	100
Gauze compresses 10 x 10 cm, 12 ply, nonsterile	500
Ballpen, blue or black	10
Exercise book A	4
Health care + Plastic sachet	500
Small plastic bag for drugs	2000
Notepad A ₆	10
Thermometer (oral/rectal) Celsius/Fahrenheit	6
Protective Glove, nonsterile, disposable	100
Treatment guidelines for basic list	2

EQUIPMENT :

Nail brush, plastic, autoclavable	2
Bucket, plastic, approx. 20 litres	1
Gallipot, stainless steel, 100ml	1
Kidney dish, stainless steel, approx. 26 x 14 cm	1
Dressing set (3 instruments + box)	2
Dressing tray, stainless steel, approx. 30 x 15 x 3 cm	1
Drum for compresses approx. 15 cm H, ϕ 14 cm	2
Foldable jerrycan, 20 litres	1
Forceps Kocher, no teeth, 12-14 cm	2
Plastic bottle, 1 litre	3
Syringe Luer, disposable, 10 ml	1
Plastic bottle, 125 ml	1
Scissors straight/blunt (12-14 cm)	2

REFERENCE

1. WHO Emergency Health Kit-Standard drugs and Clinic equipment for 10,000 persons for 3 months, WHO, Geneva, 1984
2. The new emergency health kit - In 1987 a thorough evaluation of the experiences with the WHO Emergency Health Kit was executed by the London School and was published in Tropical Doctor (1988; 18 : 155-8).



PSYCHOLOGICAL EFFECTS OF DISASTER

Dr Gary Jackson

Worldwide the frequency of disasters has been increasing over the past few decades. A United Nations survey of over 300 disasters, found that 85-90% of these had occurred since 1950. Furthermore 90% had struck developing countries. The psychological effects of disaster depend on:

- * The extent of loss or threat of loss sustained
- * The individual characteristics of the victim, their beliefs (religion, philosophy, ways of attributing meaning to events such as a disaster), their type of personality, their degree of preparedness for dealing with disasters, their age, sex and their history of physical and psychological health.
- * Whether social and psychological support is available and effective, and physical/material assistance is given, and the victims have other opportunities for getting back to normal.

NORMAL RESPONSE

When a disaster strikes, the reaction of victims who survive depends on many different factors. The psychological effects vary profoundly, and, initially, it becomes difficult to define clearly the boundary between what may be considered a normal reaction to a major stressor, and what needs to be considered pathological. Not only are the severity and duration of the symptoms important indicators, but so too are the quality and cultural context of the symptoms, and the degree of disability which follows.

CULTURAL CONTEXT

Too little is known of the cultural context or of indigenous psychiatric systems. International disaster relief organizations are well placed to study them so that they could be integrated into the relief operation itself. This would ensure that the needs of the people affected by the disaster are addressed as defined by them, rather than by outsiders.

Although studies have often not been systematic or have not had an anthropological/cultural approach, there appears to be an abnormally high rate of distress over the first few months following a disaster in poorer countries, but little has been written about such reactions beyond this crisis period.

EXAMPLES

PERU

Following the 1970 Peruvian earthquake, many survivors flocked to field clinics without injury, but complaining of 'susto' - fear. Initially people were in a state of shock and stunned and wandered around aimlessly. Later, they began to help one another and became hyperactive and euphoric. This was linked with depression due to the losses sustained, and possible feelings of guilt about those who died.

NICARAGUA

A study of reactions to the 1972 Managua/Nicaragua earthquake monitored rates of hospital cases during the year following the quake. Consultation rates for neurotic problems increased during the first few months. However, the pattern over the full year was less conclusive.

FIJI

After a cyclone which severely damaged a small Fijian village in 1983, a sample of 75 people demonstrated twice the normal rate of emotional disturbance 10 weeks after the disaster as measured by the General Health Questionnaire. However this returned to pre-disaster levels three months later.

BHOPAL

A newspaper report by the Guardian, 2 December 1989, referred to a non-governmental study of the survivors of the Bhopal industro-chemical disaster, 5 years after it happened. Fifty-seven per cent of the people assessed by a psychiatrist were diagnosed to be suffering from post-traumatic stress disorder (PTSD).

PSYCHOLOGICAL HELP FOR DISASTER VICTIMS

If workers at a disaster understand how distress is expressed among its victims they will be able to anticipate how people will respond and thus plan appropriate methods to help them. We emphasize psychological help, as the examples above demonstrate. Ideas have developed from studies in industrialized countries, where one method which has been effective is the opportunity for the victim to talk about the experience, either in a group, or one to one with a counsellor. This reduces the levels of distress.

Mobilize the local community to give help

Some people do not develop any symptoms until weeks or months later, therefore follow-up of victims is essential. In addition to informing victims of how to seek help if the need arises, a more active follow-up may be required. Experience

suggests that it is often the most ill who cannot, or choose not to, seek assistance. It is important to educate local health workers, schools, teachers, traditional healers, religious leaders, and other community members to whom people may turn for help, about the psychological effects of disasters. This can help the efficient recognition, and referral of those in need.

Before offering help, it is vital to be familiar with the traditional help resources (eg. village elders, traditional healers) and ways of coping. One should aim to bolster these resources, working with them in as complementary a fashion as possible. Initial and continuing consultation with important community figures is important when workers come in from outside.

Identifying particularly vulnerable groups

It is critically important to consider the social environment, particularly when considering the large refugee populations created by disasters. Although migration may provide new opportunities for some, refugees, suffer many losses, their homeland, possessions, social structure and pattern of life. Many refugees are interned in refugee camps, with the additional stresses of overcrowding, poor food, unsanitary conditions and personal danger.

Develop a sense of belonging

Promoting a sense of community amongst refugees could be achieved by housing families together and old neighbours next to one another. Family and community support may minimize the effects of the immense disruptions they have experienced. Developing 'pseudo-families' for those who must live with little hope of re-unification with their own extended families should be considered. Self-help organizations must also be supported.

THE NEEDS OF RELIEF WORKERS

It is important also to be aware that relief workers, both those from within the affected community and those brought in from elsewhere, may experience feelings of helplessness and a sense of inadequacy. Because they work in a place of stress they feel very vulnerable. There are two typical reactions to this: either one of physical and psychological withdrawal, or a potentially counterproductive increased pace of work.

Stressful over-exposure of relief workers must be avoided by ensuring opportunities for support groups, carefully limited working hours and good breaks away from the disaster areas where they can live a normal life. People brought in to assist local services should be selected on the basis of their maturity,

emotional stability, experience and sensitivity to cultural differences. They must be adequately prepared for the task at hand.

EDITORS' NOTE

Dr Jackson was invited to write this introduction to the two papers which follow. His fuller paper will appear elsewhere.

COPING WITH NATURAL DISASTERS: THE ROLE OF LOCAL HEALTH PERSONNEL AND THE COMMUNITY

The Tasks of the Local Health Personnel

Organizing the Health Centre or Hospital to Meet the Emergency:
As soon as possible after disaster has struck, all local health personnel should report to the health establishment where they usually work. The first task is to assess quickly any damage suffered by the establishment and its health facilities and to decide whether it can still be used or whether it would not be better to move its operational base to a less damaged building or to a temporary shelter (tent or other). If a move is necessary, a new health centre or hospital will quickly be established, use being made of any health equipment and material it has been possible to salvage.

Experience shows that during the first few hours it is above all relatives, friends and local volunteers who bring the injured to the health establishment. Preparations to receive them must be made by setting aside a space where the local health personnel can screen them to determine what care they require, while the volunteers concern themselves with receiving them on arrival.

When there are enough local health personnel to receive the injured at the health establishment, one or more health posts can be established where rescue work is being undertaken and at which first aid can be given to the rescued before they are carried to the health centre or hospital.

The local health personnel can also act before a victim is extricated, for example by applying a tourniquet when the person concerned has had a leg or arm crushed or has lost all feeling in fingers and toes (thus preventing the "crush syndrome")

Triage

When a large number of injured people are brought at the same time to the health establishment, the more expert among the local health workers, taking into account the equipment and professional skills available, must sort the cases into the following categories:

1. Those who must be sent urgently to the nearest properly equipped hospital. Among these two orders of priority may be distinguished:

1.1. Emergency cases that must be operated on within the hour:

- * acute cardio-respiratory insufficiency,
- * severe haemorrhages,
- * internal bleeding,

- * rupture of the spleen,
- * injuries to the liver,
- * severe chest lesions,
- * severe cervico-maxillary lesions,
- * states of shock,
- * severe burns (over 20%),
- * skull injuries with coma.

4.2. Emergency cases in which it is possible to wait a few hours before operating:

- * ligatured vascular injury,
- * intestinal lesions, severe haemorrhage or shock,
- * open joint and bone injuries,
- * multiple injuries with shock,
- * injuries to the eyes,
- * extensive closed fractures and dislocations,
- * less severe burns,
- * skull injuries without coma.

B. Those given attention on the spot. Priority is given to the most serious cases among those with a chance of surviving: there are those who are attended to while waiting to be sent to a specialized centre and those who do not need major medical care and can be treated on the spot. The B group also includes very serious cases with no chance of survival that it would be pointless to move.

Victims can be transported from the local health establishment to a better-equipped hospital by local means of transport or, later, by means of transport (ambulances, cars, helicopters, ships, etc.) from elsewhere. The people in the community or from outside who deal with transport must know what hospitals can receive the injured. This information must be given to the community by the authorities at intermediate level or the national authorities. The local health personnel must also be prepared for the possibility of all communications being cut and being forced for a certain time to rely solely on their own resources and professional skills.

Emergency Care

In many cases the local health personnel do not have available the specialists and resources needed after a disaster to treat all emergency cases on the spot. Often they are forced to confine their efforts to screening the victims and providing care for those who are able to survive without major medical assistance. In every instance the local personnel must be trained to receive the following medical emergencies:

- | | |
|--------------------------|-----------------------------------|
| * haemorrhages | * dislocations |
| * Cardiovascular failure | * burns |
| * respiratory distress | * exposures to toxic substances |
| * states of shock | * electrocution |
| * skull injuries | * drownings |
| * fractures | * cases of accidental hypothermia |

The types of emergency vary according to the kind of disaster and how and when it strikes.

In earthquakes there is a high level of mortality as a result of people being crushed by falling objects. The risk is greatest inside or near dwellings but is very small in the open. Consequently earthquakes at night are more deadly. There are large numbers of injuries. During the night fractures of the pelvis, thorax and spine are common because the earthquake strikes while people are lying in bed. In the daytime injuries to the arms and legs, the collarbone and the skull frequently occur. There may be people in a state of shock and people suffering from burns (particularly in areas where electricity and gas are installed). Afterwards there may be surgical complications of fractures or infections of wounds.

In volcanic eruptions mortality is high in the case of mudslides (23000 deaths in Colombia in 1985) and glowing clouds (30000 deaths at Saint-Pierre in Martinique). There may be injuries, burns and suffocations.

In floods, mortality is high only in the case of sudden flooding: flash floods, the collapse of dams or tidal waves. Fractures, injuries and bruising may occur. If the weather is cold, cases of accidental hypothermia may arise.

In cyclones and hurricanes mortality is not high unless tidal waves occur. The combined effect of wind and rain may cause houses to collapse. A large number of objects may be lifted in the air and carried along by the wind. This may give rise to injuries, fractures, cuts and bruises.

In droughts, mortality may increase considerably in areas where the drought causes famine, in which case there may be protein-calorie malnutrition (marasmus, kwashiorkor) and vitamin deficiencies (particularly vitamin A deficiency leading to xerophthalmia and child blindness). In famine conditions measles, respiratory infections and diarrhoea accompanied by dehydration may bring about a massive increase in infant mortality. When people migrate and settle on the outskirts of towns and villages, poor hygiene and overcrowding may facilitate the spread of endemic communicable diseases (diarrhoeas, tuberculosis, parasitic diseases and malaria).

TRAINING FOR DISASTER PREPAREDNESS AND RESPONSE

Jean Pierre V H Revel*

INTRODUCTION

Disaster preparedness aims at the reduction of adverse effects of the impact of disasters. Successful disaster preparedness programmes require several components, one of the most important of which is trained personnel. This paper will highlight and emphasize the needs for adequate training programmes according to the types of disaster, the level of the audience addressed and the characteristics of the community.

'Il faut d'une des secours immediats, car ce qui peut sauver aujourd'hui le blesse ne le sauvera plus demain ... Par consequent, il faut des infirmiers et des infirmieres volontaires, diligents, prepares ou inities a cette oeuvre'.

Henry Dunant, made this statement more than 120 years ago in *Un souvenir de Solferino*. Since then, it has formed the basis for many of the actions of the International Red Cross and Red Crescent Movement, emphasizing, as it does, the need for immediately available trained personnel in disasters. Although there is now general agreement on the need for the training of the community as a whole, recent disasters have shown that this need has yet to be met. There is a big gap between the needs and the resources available, a gap that seems to be increasing.

The objectives of this paper are to look at the needs for training - who needs to be trained and to do what - both in disaster preparedness and disaster response, and the ways in which those needs can be addressed in order to prepare the community better.

WHAT IS DISASTER PREPAREDNESS?

A disaster can be defined as 'an ecological disruption ... which exceeds the resources of the community stricken'. A disaster could also be seen as an unforeseen event, either by its very occurrence or by its magnitude, with which the community affected is unable to cope and thus needs to call for external assistance.

Training for disasters aims to enable the community to cope with disasters mainly through increasing the awareness of the community, accelerating the mobilization of extra resources and monitoring through strict procedures the rehabilitation/reconstruction phase, and improving their efficiency. The more a community is prepared the better.

Preparedness is a comprehensive approach to a disaster in which training plays a key role. It aims to reduce the mortality and morbidity, on the one hand, and on the other hand, to reduce loss of property related to the impact and post-impact of the disaster. Successful disaster preparedness programmes set

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several goals, among which the availability of trained and experienced personnel is crucial. But such experience can only be gained if an individual is either involved in responding to an actual disaster, or is trained—a much easier option.

To be prepared for a disaster and to respond to its impact on health, consider (1) the various levels of the community involved (who needs to be trained)?, (2) the type of disaster, and (3) the various activities that need to be implemented during different phases of the disaster (trained to do what, and when to do it)?

Train all levels in the community to be prepared for and to Respond to disaster

WHO IS TO BE TRAINED?

- * Train all levels of the community and be aware that special programmes and materials will need to be designed for each level.
- * Train those health personnel who will have to play a key role in responding to disasters in all priority issues such as early assessment of needs, establishing priorities, emergency measures (such as triage and life-saving activities) and organizing health care facilities in emergencies.
- * Identify members of the community who are likely to be more involved than others in responding to disasters. Gather them in a 'disaster/emergency committee' or (whatever it is called) whose main objective is to coordinate the management aspects of disaster preparedness or response. This committee should include representatives of the various sectors and organizations in the community, as well as specialists or volunteers who already have some skills and experience. They will be involved in technical and managerial training programmes.
- * Inform and mobilize the entire community through community education and awareness programmes. As with other aspects of health care, it is essential to involve the community wholeheartedly in this process.

WHAT ARE THEY TRAINED TO DO?

Relate training to type of disaster expected

Relate training to likely disaster: Training programmes must be related to the types of disaster the community is prone to. They must also take into consideration the resources of the community. It must be stressed that except for cyclones, and drought, and occasionally earthquakes, disasters rarely strike the same area within a short period of time. Disaster preparedness and response training programmes must therefore be sustainable and required continuous support and development.

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Integrate training for disaster and PHC activities

Relate training to primary health care: In view of this last point, the best way to achieve the objectives of disaster preparedness training is to integrate it within the general primary health care (PHC) programme. Whilst such training needs to be conveyed initially within the framework of national disaster plan it should be developed at provincial or district level through the established health system. This has several advantages: it reinforces the links between PHCs response to disasters and long-term development, it increases the awareness of the community and its participation in the other programmes, and it strengthens the existing infrastructure and activities. Following a disaster, it may even boost the authority, confidence and efficiency of the routine health services.

Relate training to each phase of disaster: Finally, training must apply to the various phases of a disaster, either before the impact (prevention ~~if~~ it is possible, and mitigation)/~~whenever~~ or after the impact (development of self-sufficiency in rescue and relief, reinforcement of reconstruction/rehabilitation capabilities).

TRAINING FOR THE PRE-IMPACT PHASE

Through community leaders: This will often be the most difficult aspect to implement as it is known that preventive activities are usually embarked upon with less enthusiasm than the curative ones! Get community leaders to tell people how to be prepared, why this is important and to translate strategies into action. Involve and mobilize the community: this is absolutely essential if the programme is to succeed.

Mobilize the community-essential! Work through the community

Through schools: Simple community-based activities can be spread through all kinds of media, and can be included in school programmes so that children can learn them early.

Through health training institutions: The anti-seismic rules developed by architects against earthquakes have a direct impact on the mortality and morbidity related to earthquakes. In all countries prone to this type of disaster these rules are taught in the schools for architects, urban planners and civil engineers. However, in medical and nursing schools, and when medical auxiliaries and community health workers are trained, the health aspects of disasters often receive very little attention which may lead to a large amount of suffering and death and confusion among health staff.

Through health care facilities: For health care facilities, the training will be twofold. First, aiming at the development of purely technical, curative skills, such as resuscitation, surgery and protocols for the management of common diseases such as diarrhoea, acute respiratory infection and malaria. Secondly

developing skills in management and public health, for example rapid assessments, nutrition surveys, trigger and epidemic investigation.

A disaster plan is essential

- * Prepare it
- * Test it
- * Improve it

TRAINING FOR THE POST-IMPACT PHASE

Immediately after a sudden impact disaster, for example an earthquake, the affected community is engaged in relief and rescue of the victims. The objective at this stage is to rescue, provide emergency life-saving care, and to transfer the casualties in as good a condition as possible. Training must therefore be planned long in advance, and should be implemented at all levels of the community (with a particular emphasis on the most vulnerable members). The need for an adequate disaster plan is obvious. However, it not only needs to be developed but it must also be tested and a proper evaluation of the response must be performed in order to identify where it is weak or lacking, and where it has to be improved. This information then needs to feed back into the training programmes.

In the community: Teams of volunteers must be trained for safe rescue of victims following acute disasters. Removal of debris and adequate procedures for extrication of casualties must be established and integrated in first-aid training. Rescue operations must not result in more trauma for the victims! Enthusiastic and trained volunteers are very important in rescue operations as they will be able to supervise the untrained people who often flock to help. Training programmes must focus on simple-rules-what to do how to do it most efficiently, and what to avoid doing.

Community leaders and decision-makers must be involved from the beginning. During training they will learn about the disaster plan, policies for the collection of data for the initial assessment, identification of priorities, evacuation of the population at risk, allocation of resources, coordination of assistance and later on, evaluation of the operations.

At the primary care level: At the health post/centre, training will obviously be more technical and should include the development and adoption of guidelines and standard protocols for managing common problems. An effective approach to triage must also be developed in order to ensure early screening between patients requiring first aid and those who need to be referred to a hospital or other health facility.

In the hospital: Equipment and resources should be made available at short notice. Rosters need to be organized in which junior staff are supervised by trained personnel in order to improve their practice and gain confidence in their skills. Training

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sessions and refresher courses must be organized regularly for the personnel who might be involved ideally together with field exercises.

TRAINING PREPAREDNESS AND LONG-TERM DEVELOPMENT

A disaster is often a landmark in the history of a community. People remember it because they lost relatives, friends or personal wealth. It frequently delays the socioeconomic development of the community. However, it may have positive effects when, for example, the community uses the disaster to change or to improve some behaviour or procedure. This is the challenge for us all.

Training for disasters:

- * Integrate with development programmes.
- * Inevitable change of established patterns.

Disaster preparedness and response programmes aim to prevent disasters (whenever possible), minimize their destructive effects and accelerate reconstruction afterwards. The relationship with long-term development is obvious. However, training often has to change patterns of behaviour which are deeply rooted in the cultural background of the community. These changes may be felt as a threat, as difficult, or impossible by the community and this needs to be appreciated by those people responsible for planning and implementing such training.

Training for disaster preparedness and response and long-term development can work together in several ways, namely:

- * reducing adverse health effects of disasters, thus making more resources available for long-term development.
- * improving and developing skills and expertise within the community which are useful both for disaster response and development
- * reducing the community's vulnerability to disasters
- * enhancing self sufficiency.

CONCLUSION

Training is essential so that a community is prepared to respond to a disaster. It must apply to all levels of the community. It must be adapted to the risks that the community is prone to. It must be regularly carried out, updated and evaluated, so that it can be changed and adapted as appropriate for the future.

The coming decade 'International Decade for Natural Disaster Reduction' offers an invaluable opportunity to plan and implement such training programmes.

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DISASTER SAFETY RULES *

I. GENERAL PRECAUTIONS

- Keep emergency items ready at all times in one place which is easy to reach and known to the whole family, i.e.:
 - . food (keep a stock which requires little cooking and no refrigeration; electric power may be interrupted);
 - . emergency cooking equipment;
 - . drinking water;
 - . first aid kit;
 - . emergency spare clothing;
 - . lights, flashlights, pocket torch in working order;
 - . portable radio with spare batteries, etc.
- Take similar precautions with respect to valuables, i.e.: savings, passbook, securities, cash, precious metals, seals, etc.
- Know how and where to turn off your electricity, gas, water and central heating oil.
- Discuss disaster risks with your family and make advance arrangements to get in touch with all the members in case of disaster. When a disaster occurs, all family members are not always in one place; it is better to discuss and establish in advance, means of effective communication and contact.
- Get thoroughly acquainted in advance either with existing shelters or any safe area in your vicinity and the best itinerary to get there.
- Unless you are qualified to give valuable emergency assistance, or have been allocated some specific task in connection with the disaster, or have some genuine and urgent business there, **KEEP AWAY FROM DISASTER AREA IF YOU ARE NOT ALREADY INVOLVED.** Your presence will only hamper rescue, first aid, or relief work. This is no time for sight-seeing.
- As soon as possible after you have dealt with matters requiring immediate attention, make a report of the damage you have sustained and of any urgent relief required, to your C.R. and Local U.N. Emergency Committee. Do not worry your Local Committee, or Public Officers

with any matters that are not urgent. Your other problems will be dealt with later.

II. EARTHQUAKES

Before the Earthquake

In the present state of knowledge, the timing of an earthquake cannot be predicted. However, earthquake-prone areas are generally known. People living in such areas can take a number of safety measures to minimize the impact of earthquakes.

At home

- Hire a qualified professional advisor in order to check the construction of your house against the local building codes, if any.
- Check that your house is built on solid ground, not fill.
- Check every part of the house for fire prevention:
 - put bottles of benzine or thinner firmly on the back of a shelf so that they will not fall;
 - do not store on shelves items likely to fall;
 - ensure propane-gas cylinders cannot fall over;
 - make habit of checking the safety of cooking stoves;
 - get a fire extinguisher with appropriate capacity;
 - put lids on buckets to prevent overflowing;
 - choose stoves designed not to turn over, and do not keep any inflammable articles beside the stove.
- Arrange in advance an emergency exit. It should be free of any obstacles. If possible avoid staircases, otherwise they should have bannisters on each side and should be kept clear of any kind of obstacles such as toys, boxes, bottles, etc.
- Ensure that all doors in the emergency exit always have a key in the lock. Do not cover the stairs and polished floors with carpets or doormats in order to avoid slipping.
- Conserve drinking water in tanks, cisterns, etc.

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At your place of work

- Assign tasks to each person in case of earthquake such as a group in charge of emergency evacuation and a rescue group.
- Take the same precautions as those taken at home, adapting them to the characteristics of your working-place.
- Emergency equipment must be clearly marked and ready for use at any time.

During the EarthquakeWherever you are, do not panic, be calm !If you are indoors

- Stay inside. If you run outside you may fall on the staircase, be blocked in the lift which might collapse or be hit by falling debris.
- Take cover under heavy furniture like desks, tables, benches or under doorways, in halls and against inner walls. Stay away from glass (windows, etc.) and chimneys.

At your place of work

- Act in accordance with the emergency role assigned to you.
- Check that there is no fire where you are. Fight fires as they start.
- Obey the instructions of the person responsible for fire prevention.
- The use of dangerous objects or equipment with flame should be stopped immediately.
- Lead evacuees to a safe place.

At a public place (movie theater, department store, etc.)

- Do not panic! It is dangerous to rush to the exit. Try to protect yourself under doorways or against inner walls. Walk out (do not run) when the shaking has stopped.

If you are outdoors

- Move away from buildings, high walls and utility wires.

- If caught beside a big building, seek shelter under archways, doorways, which offer protection from falling debris. Do not run through or near buildings.
- If you are in a moving vehicle :
 - in the country side: stop the vehicle in the closest safe place, away from precipices or slopes where landslides may occur and, if possible from trees, and remain inside your vehicle until the shaking stops;
 - in a city or town: stop as quickly as safety permits (far from tall buildings if possible) and stay in the vehicle until tremors subside.

After the Earthquake

If you are indoors

- You should first take care of fire at home. If a fire starts put it out promptly.
- Do not use candles, matches or other open flames, either during or after the tremor.
- Check your utilities, but do not turn them on. Earth movement may have cracked water, gas, and electrical conduits.
- If you smell gas, open windows and shut off the main valve. Then leave the building and report gas Leakage to authorities. Do not re-enter the house until a utility official says it is safe.
- If water mains are damaged, shut off the supply at the main valve.
- If electrical wiring is damaged, close the switch at the main meter box.
- Turn on your radio or television (if conditions permit); information and instructions will be broadcast by radio.
- Stay off the telephone except to report an emergency.
- Calmly get out of the building (do not run) and go to open spaces. Look out for slates and other falling debris. If you are in town, keep away from buildings (at least for a distance of half the height of the tallest one).
- Do not go sight-seeing.
- Stay out of severely damaged buildings, aftershocks can shake them down.

If you are outdoors

- Stay outdoors and go to open spaces.
- If in a vehicle, drive slowly and listen carefully to traffic information by radio and follow the instructions. Everyone should obey the instructions; it will cause great confusion if anyone drives his car at his own convenience.

When you take shelter, remember these things :

In severe earthquake roads will be broken-up, traffic signals will not work, and there will be confusion. It is better to evacuate on foot. It is usually dangerous to go by car. False rumors are apt to circulate after tremors and more do after a severe earthquake. When you evacuate listen to the information given by the representatives of the authorities directly or through the radio.

Take with you minimum personal belongings such as you need in case of emergency (see: "General Precautions", above). Pieces of furniture or large luggage carried onto the road will get in the way of evacuees and rescue teams.

Avoid walking along a wall, under a cliff, or by a river.

Be careful of broken electric wires hanging down.

Take a cushion with you to protect your head from objects falling from above such as roof slates, sign boards or broken pieces of glass.

III. TSUNAMIS (tidal waves)

If you live in low-lying coastal areas, an earthquake may be your only warning that a tsunami is about to strike. As soon as the shaking stops, start for high ground or inland as far as possible, and stay there until officials have sounded the all-clear.

- Tune in to your nearest operating radio station and follow instructions.
- Keep away from streams flowing into the sea.
- If the sea recedes, do not go down to the beach, the water can return rapidly.
- If time permits, act as for a flood (see below)

IV. FLOODSBefore the FloodPermanent precautions

- Keep on hand materials like sandbags, plywood, plastic sheeting, and lumber.

- Install check valves in building sewer traps, to prevent flood water from backing up in sewer drains.
- Keep your automobile fueled; if electric power is cut off, filling stations may not be able to operate pumps for several days.

When you receive a flood warning and are likely to be affected

- Act on any warning and instructions given over the radio or by civil defense officials or the police.
- Disconnect electrical appliances.
- Move all valuable personal and household goods, food, clothing, etc., out of reach of water.
- Remove weed killers, insecticides, etc., out of likely reach of water as these could cause dangerous pollution.
- Store drinking water in clean bathtubs, and in various containers. Water service may be interrupted.

If you have to evacuate

- If forced to leave your home and time permits, move essential items to safe ground; fill tanks to keep them from floating away; grease immovable machinery.
- Turn off electricity, gas, central heating oil, lock the doors and windows.
- Move to a safe area before access is cut off by flood water.
- Take with you food, drinking water, warm clothing, personal and family documents, any essential medicine and infant care and personal toiletry items.

During the Flood

- Avoid areas subject to sudden flooding.
- Do not attempt to cross a flowing stream where water is above your knees.
- Do not attempt to drive over a flooded road, you can be stranded and trapped.
- Keep listening to the instructions given over the radio.
- Avoid unnecessary exposure to the elements.
- Keep away from places where a landslide may occur (steep slopes, etc.).

V. HURRICANES

If strong winds and storm surge are phenomena that may accompany a hurricane, everyone should keep in mind that river floods also constitute a high risk. Actually, most of the damage caused by a hurricane is usually caused by the action of water and not wind. Therefore, the instructions given above for floods, also apply in the case of a tropical storm.

Before the Hurricane Strikes

At the beginning of the hurricane season

- Make a thorough check-up of your shutters, hooks and latches.
- Check that the galvanised sheeting or other material of the roof of your house is properly fastened.
- Keep nails, hammers, wire, rope and pliers handy.
- Keep a supply of timber in order to board up windows and doors.
- Keep a sufficient supply of kerosene oil available for domestic purposes.
- Keep a flashlight, hurricane lamps, candles and matches in your house together with simple first aid equipment such as iodine, bandages, eye lotion, etc., and keep them handy.
- See that there are adequate water storage facilities such as tanks, drums, barrels, etc. If possible, tanks should be available in your house well in advance of the hurricane season.
- Re-stock your supply of non-perishable foods, especially things which can be eaten readily without cooking or with very little preparation.
- See that you have a transistorized radio with enough spare batteries.

When you hear the first hurricane advisory

Listen for weather bulletins, this will prepare you for hurricane emergency well in advance of the issuance of watches and warnings.

When your area is covered by a hurricane watch

Continue normal activities, but stay tuned to radio or television for all National Weather Service advisories. Remember a hurricane watch means possible danger within 24 hours; if the danger materializes, a hurricane warning will be issued. Meanwhile, keep alert. Ignore rumors.

When your area receives a hurricane warning

- Be calm. Your ability to meet emergencies will inspire and help others.
- Plan your time before the storm arrives and avoid the last-minute hurry which might leave you marooned, or unprepared.
- Keep calm until the emergency has ended.
- Listen to the radio. If you live in isolated parts of the country, make sure that your neighbors are aware of the latest situation reports.
- Pay no attention to rumors. Rely on official advice and warning.
- Get away and stay away from low-lying beaches or other locations which may be swept by high tides or storm waves (storm surge). If your only passage to high ground is over road likely to be under water during a severe storm then leave early. Do not run the risk of being marooned.
- If your house is out of danger of high tide and is well built (securely anchored to foundation with a good roof also securely fastened) then it is probably the best place to weather out the storm.
- Get in extra food. Remember that electric power may be off and you may be without refrigeration.
- Take in at least a several-day supply of drinking water as cisterns and wells may become polluted from salt water and other causes. Sterilise the bathtub and fill it with water. Also sterilise and fill all jugs, bottles, cooking utensils, other containers as water services may be interrupted.
- Disconnect the intake of your cistern and block the outlet as tightly as possible as otherwise the water in the cistern may become contaminated with salt water.
- Board up windows or protect them with storm shutters and tape. When you board up, use good lumber securely fastened. Danger to small windows is mainly from wind-driven debris. Larger windows may be broken by wind pressure.
- Secure outdoor objects that might be blown away or uprooted. Garbage cans, garden tools, toys, signs, porch furniture, and a number of other harmless items become missiles of destruction in hurricane winds. Anchor them or store them inside before the storm strikes.
- Heavy foliage of fruit trees should be lightened. Harvest and store all nearly ripened fruits. This will save them from being wasted and will be a handy source of food after the hurricane.

- Moor your boat securely before the storm arrives, or evacuate it to a designated safe area. When your boat is moored, leave it, and do not return once the wind and waves are up.
- Make certain you have gasoline in your car..

During the Passage of the Hurricane

- Stay indoors. Keep off the streets during the passage of a hurricane unless it becomes absolutely necessary.
- If the eye of the hurricane passes over your place, there may be a lull lasting from a few minutes to half an hour or more. Stay in a safe place. Only make emergency repairs during the lull if necessary, but remember the wind will return suddenly from the opposite direction, frequently with even greater violence (remember to check that a window or door can be opened on the new leeward side of the house and board up the one you kept free before).

After the Hurricane has Passed

- Seek medical care for persons injured at a hospital, health center, dispensary or emergency first aid station.
- Do not touch loose or dangling electric wires or power lines. Report such damage directly to the Electricity Authority or nearest Police Office, or Office of the Public Works Department.
- Report broken sewer or water mains directly to the Sewerage and Water Authority or to the nearest police officer or any available authority.
- Do not empty water stored in bathtubs or other receptacles and boil drinking water until you are sure that a safe water supply has been restored.
- Be alert to prevent fires. Lowered water pressure or broken mains make fire-fighting very difficult.
- Guard against spoiled food in refrigerators if the power has been cut off for any length of time.
- Beware of broken trees. Pick up fallen branches and other debris and pile them where they can be most easily collected.
- Drive motor vehicles cautiously. Debris-filled streets and roads are dangerous. Where a road passes near the edge of a cliff or a river bank the soil may be washed away underneath and the road may collapse under the weight of vehicles.

* Dr C. De Ville De Goyet, Chief, Emergency Preparedness and Disaster Relief (PED) PAHO/WHO at the request of WHO/HQ Staff Committee.

CASE STUDY - CHEMICAL HAZARDS

DISTRICT DISASTER MANAGEMENT PLAN

INTRODUCTION

This case-study pertains to off-site Emergency Plan (District Disaster Management Plan) of the State Administration and On-site Emergency Plans of individual industries. Only the specific conclusions are summarised and issue highlighted. It would be relevant to elaborate certain basic concern that lead to this exercise. Tata Risk Management Services (A division of Tata Sons Ltd.) were retained owing to their poineering effort of over a decade in impact assessment of hazards & risks and mitigation of industrial hazards in Developing countries. The Ministry of Environment, Govt. of India realised the serious consequences of environmental impact resulting from Chemical disasters and directed this study. It was felt that in a developing economy the priority on sustainable development should be given to the reduction of consequences of such disasters.

Just to cite one example an industrial untt had on Oleum spill leading to release of Gas. The Industry was originally set-up well outside the city limits but with the passage of time the city had expanded to envelope the industry itself.

Area affected	: 3 Square Kilometers
Population Density	: 6,500 per sq.km.(approx.)
Manday Lost	: 5000,000 Mandays Approx.
Turnover Loss	: Indian Rupees 1.40 Billion Approx.
Downstream Loss	: Indian Rupees 1.00 Billion Approx.
In-Direct Employment	
Loss in Manday	: 50,000 Mandays Approx.
Environmental Damage Caused:	Not assessed.

Conclusion : Inadequate On-Site Measure for containing the spill. Non-Existent District Disaster Management Plan Led to wide area being affected for long duration.

BACKGROUND

United Nations Environment Programme (UNEP), in late 1986, suggested a series of emergency measures to help Governments, particularly in developing countries, to minimise the occurence of harmful effects of chemical accidents. In this context, UNEP developed, in cooperation with various industries, a 'Handbook' on 'Awareness and Preparedness for Emergencies at local level', the acronym being APELL. APELL guidelines were to be used for developing Off-site Crisis Management Plans for Chemical disasters.

It is acknowledged that regardless of the disaster, whether the

the cause the environmental impact is immense whether it is on a short term and or a long term basis. APELL and the experts connected with this matter in their wisdom, mentioned the consequences of a disaster regardless of the cause as these could be natural or man made. Our knowledge has not progressed to the stage where all causes of naturally occurring events are understood, predicted or effectively prevented. However, the need to prepare ourselves to respond to accidental emergencies when and where it occurs, cannot be underestimated. Therefore, response Plans should be effective enough to mitigate the losses to the extent possible in case of such accidents.

A proper on-site Emergency Plan can contain a large number of potentially disastrous situations confined to the boundaries of the industrial unit. However, accidents can and will happen and if an incident goes out of hand it can lead to a major catastrophe having off-site implications. APELL handbook has clearly identified that to mitigate such disasters the FIRST RESPONSE TO THE EMERGENCY, THE SPEED WITH WHICH THE RESPONSE OCCURS, THE PLANNING ITSELF THAT HAS GONE INTO SUCH RESPONSE. are factors that reduce the losses to the community and industry itself. Thus not only a correlation was established between On-site Emergency plans, but the qualitative guideline were provided and Tata Risk management Services used these in the context of Indian environment to develop the study.

THE PROJECT

The Government of India, Ministry of Environment felt that this matter needed closer scrutiny and a select area which had a high concentration of Chemical and Petrochemical unit was identified for an indepth study by Tata Risk Management services. Broad objectives as identified by the Government for this study were :

1. Identified major hazardous units in the Area would submit their On-site emergency Plans, safety audit reports and risk Evaluation studies for examination.
2. These plan and reports would be analysed in detail for identifying hazards that may be overlooked and the effectiveness of potential measures already incorporated.
3. Analysis of Process Hazards and control subject to sufficient data being available in the On-site Plans or provided by the Units themselves.
4. Correlation of these On-site Plans with the existing Off-site Plan with the District Collector
5. Identifying further needs in terms of studies, reports or information necessary to make the Off-site Plan more effective and develop a model District Disaster Management Plan. The premise on which the model District or Area

Disaster management Plan was to be developed was consideration of existing major hazards in the area from chemical industries. Generally they were considered as :

- a. Toxic releases
- b. Fires
- c. Explosions
- d. Combinations of all three or any two of the hazards.

In 1988/89 Dr. A.F. Ellis an ILO expert provided the guidelines to the Government of India indicating threshold quantities of chemicals On-site to provide the hazard category of the Unit. Of these units the most Hazardous Category units were to be considered in this instance.

METHODOLOGY

To evaluate the exposure i.e. Off-site implications of any or all the hazards it was imperative to examine the On-site Plans of most hazardous units, examine the details contained therein and develop the MAXIMUM CREDIBLE LOSS SCENARIOS.

It would be interesting to mention that till such time that this case was considered afresh i.e. 1990 July/August, the basis of development an Off-site Plan had not been defined. Using of Maximum Credible loss (MCL) Scenarios as the base got defined in the Interaction with Government Officials, Tata Risk Management Services and visiting expert, Dr. Robert Cumberland of National Chemical Emergency Centre, Environment Informatic, Oxfordshire U.K. This is a major lacuna and it would probably apply equally to all developing countries.

The concept of MCL was a parallel drawn from the underwriting professions's assessment of maximum possible losses in case of explosion, with type difference that it would examine certain factors like available on site protections, design of structures, location and sitting of hazardous installations and their proximity with one another and the individual managements awareness of the potential hazards. Though it would be a subjective analysis, however, outside consultants (SAFETY AUDITORS) conducting it would lead to impartial assessments. In addition, it was felt that the necessary data for such assessment in totality may not be available from all the unit at that juncture, hence only the most serious hazards to be considered for off-site implications. If the Administration could gear itself to handle the most serious consequences, accidents of smaller magnitude could be handled effectively.

PROBLEMS

Having finally come to conclusion that the basis of the District Disaster Management Plan i.e. an effective Plan needed detailed analysis of On-site Emergency Plans & Maximum Credible Loss Scenarios of individual units, the question to be addressed therefore were :

- a. Analysing and evaluating MCL and therefore what data was necessary from the individual units.
- b. As per Government's guidelines, all most hazardous units had to have their On-site emergency Plans and do these plans carry enough information to evaluate MCL ?
- c. The existing Off-site Plan of the Area had to be examined de-Novo in all over 50 chemical units were examined in the identified area.

LIMIT OF DATA AVAILABLE

- Of over fifty most hazardous units, only 12 On-site plans or only a semblance of Onsite plans as a document were available.
- Some of the most hazardous units were not appearing in the District authorities list at all
- The method of categorizing most Hazardous Unit left out potentially most hazardous units from the available list only because the unit or installations themselves refused to accept their potential hazards.
- Some installations which may not per be hazardous but would act as catalyst or trigger for a major catastrophe had not been considered at all either by District Authorities or the organizations themselves like the railway Yard or Electric Generation Unit/Substation.
- Large number of hazardous chemicals, though present in substantial quantities, had not been declared to the District Authorities.
- Even the on-site Plans of 12 Units did not have data for Maximum Credible Loss scenarios. Whenever any study was carried out, it was more in nature micro study providing hardly any data for Off-site implications.
- Major hazards had not been considered and dispersion studies were limited in scope & nature
- No safety audit report, Hazop analysis, risk evaluation studies had been carried out.
- The On-site Plans also provided negligible or no data regarding major issues, e.g :
 1. Fire protection/detection measures.
 2. First Aid detail including antidotes etc.
 3. Location and alternate Central Control Room in case of emergencies.

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4. Procedures & system for activating CCR
5. Provision of emergency Lightning etc.
6. Storage layout & details of storage.
7. Meteorological data was insignificant or wrong.
8. Line of command, responsibilities & accountability of emergency personnel was not detailed.
9. No on-site Plan had considered a Domino or cascading effect on neighbouring units and vice versa in spite of close proximity.
10. Terrorist, Riot, Strike and natural calamities did not appear to have been adequately considered.
11. An Informal Mutual-Aid Programme appeared to be available however,:
12. Level & type of support was not defined.
13. No list of capabilities and facilities was available. Condition under which assistance was warranted was not laid down.

CONCLUSIONS

Regardless of the hazard involved the District Disaster Management Plans, which in essence is a safety delivery system, has to define either explicitly or implicitly what, for it, an acceptable level of risk. In the absence of crucial data from On-site.

Plans, this acceptance level becomes infinite. Thus using the Maximum Credible Loss Scenarios-would also provide the parameters for the administration, to what in effect would be the acceptable level of risk. It has to be accepted that this acceptable risk level will also be dependent on other factors like availability of financial resources, trained manpower and other priorities.

RECOMMENDATION

Tata Risk Management Services provided long term & short term recommendations in details. While it is not possible to submit these in this synopsis, major heading only are indicated here.

1. The basis of planning and Organization of an Off.-site Emergency Plan (On-site recommendations):
2. Viable communications ;
3. Effective warning system;
4. Activation procedures;

5. Systems for direction and coordination/cooperation
6. System for recovering and processing information:
In considering the major disaster effects in the area it was observed that the severity of some disasters foreseen precluded or severely restricted an orderly and well modulated approach to disaster response. In spite of limits of data, based on experience and gathered information through various agencies, a chlorine leak of the magnitude of only 20 Tonnes potentially appeared to be one such scenario.

SHORT TERM MEASURES - MOST HAZARDOUS UNITS

- a. Detailed On-site Emergency Plans for all units/installation needed to be developed including development of Maximum credible Loss Scenarios.
- b. Since shifting of existing installation was not feasible, each installation should be critically examined about its adequacy in terms of equipment/personnel and resources to handle On-site Emergencies.
- c. The details provided in a and b to be co-related to the District Disaster management Plans.
- d. The District disaster Management Plan to be effective thereafter requires :
 - i. A formally manned Central Control Room, the nature of identified hazards made it necessary to be manned 24 hours with all facilities of communications etc.
 - ii. Under the control of CCR (Central Control Room) a first response team of personnel & equipment need to be provided alongside a formal Mutual Aid Scheme to be developed.
 - iii. Hazmat (Hazardous Materials) Response team and a vanfull equipped to handle emergency should be at the disposal of CCR.
 - iv. Regular and frequent Safety Auditing of the Most Hazardous Units/Installation should be made mandatory. Safety Auditors to be external Auditors duly licenced/ approved by the Government.
 - v. Sanctions and permissions for expansion/new units in the Area should be allowed only after a close scrutiny of the Risk evaluation studies and On-site Emergency Control measures.
 - vi. The operative area of Civil defense organization as well as the authority of Municipal Fire Brigade to be extended to include these industrial Estates.

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- vii. Telecom links between the industries/District Administration and CCR to be made more efficient.
- viii. Existing hospitals to be geared to handle specific effects of the identified hazards and adequate medications and facilities made available.
- ix. The law and order agencies to be fully briefed of the potential hazards and regular drills to be conducted to ensure proper response at the time of any emergency.

LONG TERM

1. The town planning activity to keep in mind the identified hazards and the danger zones.
2. Link roads, Bypasses, Overbridges, railway crossing, Railway trunk Lines, shunting yards to be realigned/developed/ repaired to ensure smooth emergency operations.
3. Toxicological Research should be carried out with regards to all hazardous chemicals and a proper Data Base prepared.
4. A project on the basis of Chemsafe (U.K.) should be taken up to advise the Central Control room & the Civic authorities including Industries on Chemical spills, Accidents-transport or industrial.
5. The Central Control Room should be provided with Data Processing net Work linked to all the Industries & heads of Civic bodies not only for Data acquisition & Retrieval but to serve as instantaneous communication facility also.

PRESS CUTTING ON SUPREME COURT JUDGEMENT ABOUT OBLIGATION TO EXTEND
MEDICAL SERVICES FOR PROTECTING LIFE

NO FETTERS TO A DOCTOR'S DUTY: SC

By ALLWYN FERNANDES

THE Supreme court has ruled that "every doctor, whether at a government hospital or otherwise, has the professional obligation to extend his services with due expertise for protecting life and that no law or state action can intervene to avoid or delay the discharge of this "paramount obligation cast upon members of the medical profession".

In a landmark judgment, Mr Justice R N Misra and Mr Justice G L Oza have observed that this obligation was "total, absolute and paramount". All laws of procedure which interfere with its discharge cannot be sustained and must, therefore, give way and zonal regulations and classifications spelling out the jurisdictions of hospitals "cannot also operate as fetters", they added.

"The matter is extremely urgent and brooks no delay to remind every doctor of his total obligation and assure him of the position that he does not contravene the law of the land by proceeding to treat the injured on appearance before him either by himself or carried by others", it was observed.

If the doctor finds that the aid he could give is not enough to save the life of the person, it is his duty to give the patient all possible help and see that he/she reaches a suitable doctor "as early as possible".

At the same time, the judges hoped that the police, lawyers and judges would also keep in mind that doctors should not be unnecessarily harassed to comply with legal formalities, or subjected to needlessly long cross examination that is sometimes humiliating.

Dragging doctors to police stations should be avoided as far as possible and courts should not summon them to give evidence, unless necessary.

"Unnecessary harassment of the medical profession, by way of requests for adjournment or by cross examination should be avoided so that the apprehension that doctors have which prevents them from discharging their duty to a suffering person when he needs their assistance utmost, is removed".

The Court has observed that there is no legal impediment to a doctor requested to attend to an injured person immediately.

But at the same time "the effort to save the person should be the top priority not only of the medical profession, but even of the police, or any other citizen who happens to be connected with the matter, or who happens to notice such an incident or a situation", the court has observed.

The Supreme Court justices observed that there could be no second opinion that preservation of human life was of paramount importance. That is so on account of the fact that once life is lost, the status quo ante cannot be restored as resurrection is beyond the capacity of man," they added.

They went on to say that those incharge of the health of a community had the obligation to preserve life, whether they be innocent persons or criminals, "so that the innocent may be protected and the guilty may be punished. Social laws do not contemplate death by negligence to be tantamount to legal punishment".

The Judges were dealing with a petition brought by a human rights activist who acted on a Delhi newspaper item headlined. "Law helps injured to die". The report said a scooterist, knocked down by a car and taken to the nearest hospital by a passerby, was refused aid.

The Good Samaritan was asked to take the victim to another hospital dealing with medico-legal cases 30 km away. The man did so, but the victim died on the way.

The Union health secretary, the Medical Council of India and the Indian Medical Association were impleaded as respondents in the case. Documents appended to the affidavits of these respondents showed that the questions raised in the petition had engaged the attention of the Central and State governments for over a decade, but there had been no change in the situation.

The Medical Council of India told the court that there was nothing in the law to justify the attitude prevailing among doctors. True, the code of medical ethics does not bind a physician to treat every one seeking his services and that he is free to choose those whom he would serve.

But the code also says that in emergencies, for the sake of humanity and the noble tradition of the profession, he should be ready to respond to the calls of the sick and injured "whenever temperate public opinion expects the service".

Once having undertaken a case, he should not neglect the patient, nor should he withdraw from the case without giving the patient adequate notice to find another medical attendant.

: 3 :

Mr. Justice Oza observed that wellintentioned decisions taken at the highest level for public good unfortunately never reached the common man and only remained "a text good to read and attractive to quote".

Mr. Justice Misra⁷ said every doctor in India should be aware of the court's position and, therefore, directed that the decision be given wise publicity by the national media through Doordarshan and All India Radio.

High Court Judges have also been directed to bring it to the attention of every judge in lower courts and the Medical Council of India has been asked to send a copy to every medical college affiliated to it. State Governments have also been asked to publicise the judgment wisely so that "every practising doctor would soon become aware of the position".

The judges referred to decisions taken in 1985 of a high-powered committee set up by the Central Government under the Chairmanship of the director-general of health services and sent to all States.

These decisions State that doctors in hospitals should inform the constable on duty of the name, age and sex of the patient and the place and time of the indident and start treatment immediately. It is the constable's duty thereafter to inform the concerned police station or higherups.

Medico-legal cases brought to hospitals should be attended to even if the incident has occurred in the jurisdiction of another hospital. All government hospitals and medical institutions should provide primary medical aid regardless of whether they are medico-legal cases or not and then referred to other hospitals where the expertise required is available.

COMPREHENSIVE ACCIDENT EMERGENCY HEALTH CARE PLAN FOR THE STATE OF MAHARASHTRA, INDIA

Dr S M Bhadkamkar *

1. INTRODUCTION

The State is committed to achieve the goal of Health for All by 2000 AD. as early as possible. Though the main approach to attain this will be through proper development of Primary Health Care still establishing proper referral curative services is also very important. Though health emergencies form but a small portion of the total curative cases still it is the most critical part of that system. In fact, health emergencies are so common that every health institution irrespective of its size and location has to face them day in and day out. Health emergencies can be classified into following four broad groups:-

1.1 Mass Casualties

They can come in the form of mass casualties in a disaster and can put extra ordinary strain on the existing local health system and will require many times substantial assistance from outside.

1.2 Trauma Victims

1.2.1 Intentional injuries such as gun shot, wounds, stabbing.

1.2.2 Unintentional trauma cases after accidents either on road, railway tracks, water ways or in Air.

1.3 Acute Coronary Attacks

Many health emergencies now a days come as acute cardiac problems like coronary attacks, where immediate health care is absolutely essential.

1.4 Individual cases of sudden illness

Health emergencies such as burns, poisoning, paediatric, obstetric, and Gynaec. emergencies, respiratory track obstructions, etc. are also very common.

2. EXTENT OF THE PROBLEM

2.1 The number of casualties in a disaster depends upon the type of disaster, its extent, time of occurrence and number of other factors. Heavy floods as well as acute and excessive scarcity conditions, severe cyclones and earthquake, extensive fires are common in our country and thousands of health emergencies are required to be treated.

* Paper read in the Conference of All India Surgeons to be held at Varanasi from 27th to 29th December 1989.

2.2 Trauma Cases resulting especially from Road accidents are definitely on increase which will be obvious from the following:

During 1987, out of total 2,21,619 road accidents in the country, 56402 took place in Maharashtra. During that year, in our State 4631 persons were killed and 27149 were seriously injured. The metropolitan cities and major towns account for 70% of the total accidents, 50% coming from Bombay and 20% from other areas.

Maharashtra has one of the highest accident rates in the country. During 1978-87, the number of accidents the State has increased from 39,835 to 56,402 and fatalities from 2,378 to 4,631. The fatality rate is about 25 per 10,000 vehicles as compared to 5 deaths per 10,000 vehicles in developed countries. Thus the road accident scenario presents a grave picture indeed. Major causes for the road accidents are -

2.2.1 As against 87,662 vehicles in 1961, there are now 20,92,638 vehicles representing an increase of 2,387%

2.2.2 Poor road conditions, inadequate traffic management, drivers driving under influence of alcohol, etc. are other factors.

2.3 The activities of the extremists, civil disturbances and riots, result in increase in number of intentional injurious by gun shot, stabbing, etc.

2.4 Heart Attacks - The expectation of life in our State has now increased to 59. Therefore, many people live during the heart attack prone age. Similarly due to change in the life style, the habits of smoking and drinking which pre-dispose to heart attack are on increase.

Similarly the stress and strain of modern life also make people vulnerable for heart attacks. All those facts will make it clear that the number of health emergencies are on increase.

3. EXPERIENCE IN DEVELOPED COUNTRIES:

Health emergencies are also common in developed countries. However, during last two decades, they have developed an Emergency Health Care Programme which provides prompt and adequate health care for the victims. They have been also carrying out intensive public education and information programmes to reduce the incidence. This has resulted in not only reducing the number of health emergencies, but also the morbidity and mortality resulting from them in those countries. Further the comprehensive rehabilitation services provided have reduced the impact of the disabilities and enable the victims to lead a meaningful life.

However, in our country, the scenario is quite different. There is hardly any attempt made to carry out public education in this regard and there is no serious effort for developing and implementing a comprehensive emergency health care plan.

4. NECESSITY FOR A COMPREHENSIVE EMERGENCY HEALTH CARE PLAN

Taking into consideration all the above facts, the State has prepared a comprehensive emergency health care plan. This plan will not only provide curative services, but will also take care of preventive and rehabilitative aspects. The aim of the plan is not to provide the facilities for the privileged few but for the entire State and that too both in space as well as time i.e. to make services available round the clock for all the areas in the State.

The Emergency Health Care will not be developed as a Verticle programme, but will be integrated with the existing general health services and will be that part of Primary Health Care which responds to all Health Emergencies.

All the available existing facilities and manpower will be fully utilised and additional inputs which are absolutely essential will only be provided. Even here, attempts will be made to reduce the financial burden on State and Central exchequer by getting equipments, ambulances through donations or internal resources which will arise due to more collection due to increase in fee rate, Race Day Fund collection, etc. Wherever possible, international assistance will be taken especially for training programme, teaching aids, etc. In fact, WHO has already given a token grant of Rs.2 lakhs so far for training. We have also received a number of assurances for donations.

Now is the very opportune time for taking up Emergency Health Care Programme, as WHO has also declared the decade starting from 1990 as the decade for emergency preparedness.

5. DISASTER PREPAREDNESS

The State has also already taken some steps in 1982 about Disaster Management.

5.1 Workshops were held for Civil Surgeons explaining them the procedure of Disaster Preparedness, utility of having Disaster Drills.

In severe outbreak of riots at Ehiwandi, Dist. Thane in 1984, the Disaster Management techniques were fully applied and good results were obtained, out of the various experiences gained. A Guide to Health Management in Disaster was prepared, printed and circulated. Special workshops for Civil Surgeons were held to share the experiences of the Disaster Management and also to discuss their district plans.

5.2 However, one of the major deficiencies in the programme is the lack of disaster plan for corporation areas. Very elaborate plans are also required to meet the disasters resulting from nuclear episodes or hazardous materials. It is also necessary to hold workshop for re-orientation of officers and also to update the district plans.

6. ESTABLISHMENT OF EMERGENCY HEALTH SYSTEM (EHS)

At present the weakest link in Emergency Health Care Programme is the lack of Emergency Health System as it exists in developed countries. Unless this system is formulated and established, the emergency health care programme will not be effective. It is proposed to develop this system with following components:

6.1 In all emergencies, it is the family member or by standers who first appear on the scene. It is necessary to train them to recognise an emergency e.g. he should understand that chest pain is the symptom of heart attack. He should further be able to give First Aid and CPR so that the patient is kept alive for further intervention. Though their training is elementary, its workload is tremendous as the number involved is quite large.

6.2 Family members or by standers should also know how to initiate an emergency response through definite telephone No. or other communication facilities to activate the Police, Fire Brigade as well as appropriate health institutions. Many times, it is observed that emergency response is received by these agencies very late which results in either loss of life or permanent disability.

6.3 It is necessary to establish a net work of regional communication centres manned by properly trained despatchers. These despatchers will send not only initial messages, but will also go on giving feed back at all stages to the concerned agencies, through the communication facilities to be made available hospital ambulances and regional and State Headquarter.

6.4 Next to Family members or by standers, immediate help can come from villagers or neighbours where the incident occurs. It is, therefore, necessary to have a selected band of village and other volunteers trained in First Aid and CPR who are provided with proper First Aid boxes.

6.5 At present the emergency cases do not receive any health care at the site or during transport. They get it only when, they are brought to the hospital. There also delay can occur, if there is no properly organised emergency department. The weakest link today in the programme is lack of pre-hospital services. It is, therefore, proposed to have a fleet of Ambulances. These Ambulances will not only be basic type, but at selected places well equipped ICU Ambulances will be stationed

They will have necessary equipments and medicines for resuscitation and stabilisation and will also have facilities for treatment during transportation. They will be fitted with wireless sets for communication. They will also be manned by trained staff and wherever possible and necessary, an emergency physician will accompany, but in every case at least trained para-medical will be available.

6.6. Fire Brigade and Police will also be involved in emergency health care because in many cases first action required is a rescue operation for salvage of victims without which health care cannot be given and victims cannot be transported.

On many occasions Emergency Health Care cannot also be delivered because the crowd becomes unmanageable and law and order problem arises and so Police help is necessary.

6.7 Best pre-hospital emergency care as planned above would be a failure if the facilities at the receiving hospital are not of a high standard. Therefore, it is necessary to have properly planned emergency department for every hospital. It is further necessary to have well-trained trauma teams available round the clock. They will first carry out triage and start further resuscitation and stabilisation procedures. They they will transfer the patients to the respective wards or operating rooms. Wherever necessary, they will transfer the patients to the respective wards or operating rooms. Wherever necessary, they will transfer the patients to higher referral institution. At present, Casualty Departments which look after the emergencies are not properly designed and developed. Most of the time junior officers man them and valuable time is lost before the expert arrives at the scene. They are also not well-equipped and do not have provision for treating large number of cases at a time. Facilities for Intensive Care of different types of patients are also lacking. Under the emergency health care plan, all these deficiencies will be rectified not only upto district hospitals level, but also for peripheral institutions.

6.8 Regionalisation and net working of the institutions:

The State will be divided into 8 regions and the institutions will be identified according to the various levels of facilities available so that inter-hospital transfer becomes easy. Public, Charitable and Private Hospitals which are willing to associate with this programme will be involved. Facilities for rehabilitation will also be established in every hospital. The specialised institutions for rehabilitation will also be identified and net worked.

6.9 Computerisation of the Data:

Information about emergency health care rendered to the victims will be generated at various stages, i.e. health care

given at the site by family members by standards/village health volunteers/pre-hospital services/services at the hospital/specialised care at the referral hospital, police record, services by Fire Brigade, etc. All this valuable data requires to be properly compiled, collected and analysed for the purpose of quality assurance programme. As there will be voluminous data, it requires to be computerised. This will be done by establishing co-ordinated record system.

6.10 Review and Monitoring

Emergency Health Care will be given at various levels. In order to have a quality assurance programme, it is necessary to evaluate the quality of care given at each level during regular meetings of Emergency Health Care providers. Similarly it is essential to evaluate the operation of the Emergency Health Care System by Administrators involved at various levels.

7. MANPOWER DEVELOPMENT

7.1 Though Emergency Health Care is a very critical Service, still in our country, emergency medicine is not developed as a separate discipline and so Emergency Health Care is provided at present by staff which is not specially trained in Emergency Medicine. It is, therefore, proposed to develop this important discipline and also develop a special cadre of Emergency Physicians, Emergency para-medicals, etc.

7.2 This is very essential in view of the fact that under the programme, the totality of the coverage in space and time has been planned. The cadre of para-medicals is specially important from this point of view because this category can be easily trained in his discipline. Further it is observed that they can take up 80% of the work of emergency physicians. Their services can also be spared for field visits and can also be available round the clock of the hospital.

7.3 Therefore, training of Emergency Physicians and para-medicals on proper lines on a large scale is planned. In addition, proper training village health volunteers is also important because they are the first to treat the patient. In addition as their number will be large and as they will be available at village level, they will be very useful in disasters. They also ensure community preparedness and community participation.

7.4 Development of training materials and teaching aids

Proper and continuous training programme of all the categories involved in Emergency Health Care will be one of the key factors for the success of the programme. The training programme will cover important theoretical aspects and development of skills, but will lay stress on practical training. Therefore, proper curriculum for various categories will have to be developed. It is also necessary to prepare a technical manual which

will give details about various skills and procedures that are required to be acquired and practised. General Guide Lines and instructions will also be required to be compiled for operation and implementation of this programme. It is necessary to develop protocols for treatment by Emergency Health Care (EHC) providers at various levels so that they do not exceed their competence.

Similarly, protocols for inter-hospital transfers will have to be finalised so that cases are taken to proper hospitals where adequate facilities exist for treatment.

8. ORGANISATION

8.1 State Level

8.1.1 Establishment of the office of Emergency Health Care

Looking to the enormous work and efforts that will be required to establish the programme in the entire State, it is necessary that there should be a separate cell for the same. This should be headed by a senior officer who has full knowledge about Emergency Health Care. Hospital Administration, Primary Health Care Organisation and should be able to devote full time for the programme, as he will be responsible for planning, implementation, training, monitoring and evaluation of the programme.

8.1.2. State Level Apex Institution

This institute be mainly responsible for manpower development, high level referral care and research.

8.1.3 A State Level Committee for Inter-Departmental co-ordination and over all review of the programme will be constituted under the chairmanship of the Chief Secretary.

8.1.4 State Level Implementation Committee

This will be under the Chairmanship of the State Programme Officer who will review the actual implementation of the programme as far as Health Sector is concerned.

8.2 Regional and District Level

There will be a regional inter-departmental co-ordination committee under the Chairmanship of the Revenue Commissioner. There will be a committee under the Dy. Director of Health Services, i/c Circles for implementation of the programme in the region as far as health sector is concerned.

8.2.2 At District Level also there will be two committees, one under Collector for Inter-Departmental co-ordination and one under Civil Surgeon for review of the implementation of EHC Programme.

9. SCHEDULE FOR IMPLEMENTATION

9.1 Phase-I upto December 1991

Emergency Health Care Programme was started in the State under the guidance and dynamic leadership of Shri D M Sukhtankar, Chief Secretary on 4-7-1989 with the inauguration of the first training programme for para-medicals at his hands. During the first phase upto December 1991, following actions will be completed.

- 9.1.1 Updating the existing District Disaster Plans.
- 9.1.2 Repeat training programme in Disaster Management for Civil Surgeons and others.
- 9.1.3 Implementation of the accident emergency service projects on Pune-Kolhapur and Bombay-Pune High-way.
- 9.1.4 Implementation of similar projects for vulnerable sections on other important highways e.g.

Bombay - Nasik Highway
(Kasara Ghat, Ghoti-Igatpuri Section)

Nasik - Dhule Road
(Chandwad and Arvi Section)

Pune - Aurangabad
(Accident spots near Ahmednagar and Aurgangabad)

9.1.5 Upgradation of the Casualty Department into fulfilled Emergency Department as District Hospitals, Selected Rural/Cottage Hospitals. This will consist of -

- 9.1.5.1 Proper planning and expansion of Emergency Department.
- 9.1.5.2 Staffing by trained personnel.
- 9.1.5.3 Supply of life saving equipments and provision of advance life support.
- 9.1.5.4 Establishment of well-equipped ICUs.
- 9.1.5.5 Provision of well equipped basic and ICU Ambulances.
- 9.1.5.6 Establishment of a Radio Centre for proper communication.

9.2. Phase II upto December 1993

During this phase, the spill over actions of the first phase will be completed and also following additional activities will be undertaken:-

9.2.1 Establishment of a State level Apex Institution in EHC at G.T. Hospital, Bombay.

9.2.2 Development and implementation of Emergency Health Care Plan for all Corporation areas fully involving Fire Brigade, Voluntary agencies

9.2.3 Covering vulnerable sections of the remaining highways and disaster prone areas.

9.2.4 Developing Emergency Departments of selected Rural/Cottage Hospitals additionally selected.

9.3 Phase III upto December 1995

During this phase, spill over actions of the first and second phase will be completed and following additional activities will be undertaken.

9.3.1 Establishment of Emergency Departments in remaining Rural/Cottage Hospitals and selected Primary Health Centres.

9.3.2 Development and implementation of Disaster Plans for hazardous materials, nuclear episodes.

9.3.3 Supply of life saving equipments and drugs upto Primary Health Centre level.

9.3.4 Massive Training Programme for Medical Officers, para-medicals and village health volunteers.

10. ACHIEVEMENTS SO FAR

10.1 The First State Level Co-ordination Committee meeting held in October 1988 under the Chairmanship of Shri D.M. Sukhtankar, Chief Secretary, wherein it was decided to undertake Pune-Kolhapur Accident Emergency Pilot Project.

10.2 Presentation of this project by Dr S M Ehadkamkar, Joint Director of Health Services, (Medical) to the International Experts from U.S.A/U.K. between January-April 1989.

10.3 Press Conference by the Secretary (Public Health) on 30th June 1989 to explain the project.

10.4 Inauguration on 4th July 1989 at the hands of Chief Secretary of First Training Programme of Para-medicals.

10.5 Finalisation of curriculum of training programme of various categories.

10.6 Finalisation of protocols for treatment and inter-hospital transfer.

10.7. Details for Intensive Care Ambulance.

10.8. Formats for evaluation of quality of Emergency Health Care given.

10.9 Meeting of the Apex Institutions at Bombay on 20th July 1989.

10.10 Co-ordination meeting of the officers from various departments from Pune-Kolhapur Project conducted on 5th August 1989, by the Secretary (Public Health).

10.11 Presentation of the Project Report by Dr S M Bhadkamkar, Joint Director of Health Services, (Medical) in First International Conference on Emergency Health Care held at Washington, USA on 18th August 1989 and paper on Role of Voluntary Organizations in Emergency Health Care by Dr Gautam Sen on same day.

10.12 Comprehensive training of EHC of Dr S M Bhadkamkar, Joint Director of Health Services, (Medical) during August-September 1989 at Danbury Hospital, Connecticut and field visit in U.S.A.

STATUS REPORT ON IMPLEMENTATION OF PUNE - KOLHAPUR

ACCIDENT EMERGENCY MEDICAL SERVICE PROJECT *

Pune - Kolhapur Project was inaugurated at the hands of the Chief Secretary in a function held at Walchand Hirachand Conference Hall of Indian Merchants' Chamber on 4th July 1989. On that day, training programme for First batch of Para-medicals was started. The Secretary, (Public Health) Shri P P Mahana earlier held a press conference on 30th June 1989 and explained to the press about the project.

Following is the progress about the implementation of the project.

(1) Training :

5 Categories of staff have been identified for training, viz. Emergency Physicians, Medical Officers of the Rural Hospitals/ Primary Health Centres, Nurses and other para-medical staff, Class IV staff of the hospitals and Village Health Volunteers.

The progress about their training is given in the following table :

Sl.No.	Category of staff	No. trained	Remarks
1.	Emergency Physicians	-	6 Emergency Physicians 3 each from Civil Hospital, Kolhapur/ Satara will be trained respectively at Sion Hospital and K.E.M. Hospital, Bombay for a period of one month starting from 18th December 1989.
2.	Medical Officers	30	-
3.	Staff Nurses and para-Medicals	107	-
4.	Village Health Volunteers	390	-
5.	Village Leaders	-	1/2 day orientation of the Village leaders will be held in January 1990 by respective E.Ps.

(2) Upgradation of Emergency Department of the Government/Z.P. Health Institutions involved in the project :

A norm for equipments to be available at each level of institution is finalised. Deficiency Rectification plan for each institution based on the above norm is prepared. Deficiencies of the District Hospitals and Cottage Hospitals will be rectified by March 1990 through hospital funds, deficiencies of equipments in Rural Hospitals and Primary Health Centres will be rectified by Zilla Parishads by March 1990. An amount of Rs.4.lakhs have already been sanctioned. Vide Government Resolution dated 9-11-1989 for District Hospitals, Satara and Kolhapur.

(3) Maintenance of adequate stock of drugs and medicines :

It is now ensured that sufficient stock of drugs and medicines required to treat emergencies are available in District Hospitals and the same is being ensured at Primary Health Centres/Rural Hospitals.

(4) Ambulances :

The specifications of ICU Ambulance have been finalised and tenders will be issued within one month. For this, an amount of Rs.12 lakhs have already been sanctioned by Government vide G.R. Dated 26-10-1989.

Proposal for purchase of additional basic ambulances will also be finalised.

Government has also agreed to release additional funds collected by District Hospitals in the State in the 8th Monthly revised estimates and the Civil Surgeon, Satara and Kolhapur have been instructed to purchase other required equipments from these funds so that the number of deficiencies remaining will be reduced.

(5) Supervision :

Dr S M Bhadkamkar, Joint Director of Health Services, (Medical) visited the Rural Hospital, Khandala; District Hospital, Satara and Primary Health Centres, Kavate, Nagothane, Bhuij, etc. and given necessary instructions. He also discussed the project with the Chairman of the Health Committee Zilla Parishad, Satara who agreed to give full cooperation and support. Dr. E . S. Palnitkar, Asst. Director of Health Services, (Medical) also visited all the institutions on Pune to Kolhapur Highway and gave necessary instructions.

- 3 -

During the Visits, both have observed that there is awareness about this programme in general public. The Health Staff is motivated and the local officers are taking keen interest. In fact, few Village Health Volunteers have already attended the accident victims and brought them to the hospital for which the accident victims have expressed their appreciation.

(6) Review and Monitoring :

Formats for monthly monitoring have been finalised and circulated. The review of the Accident Emergency services rendered will be started from 1st of February 1990 regularly.

(7) Involvement of Voluntary Organizations :

Krishna Charitable Hospital, Karad; Wanless Hospital, Miraj have agreed to participate in this project.

In short, the progress about implementation of this project is satisfactory. The response and the results achieved so far are encouraging. Dr Suresh Dhumale, Emergency Physician from danbury Hospital, U.S.A. is visiting India by the end of this month. He will also visit the project area in the first fortnight of January 1990 and will get a further feed back from him. Taking advantage of his visit, it is also proposed to hold a two days workshop tentatively on 8th and 9th January 1990 for all the Civil Surgeons and selected Emergency Physicians at Bombay.

A proposal to establish an apex institution for Manpower development will be finalised by March 1990.

* Dr S M Bhadkamkar
Joint Director of Health Services,
(Medical)

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- Centre for Research on the Epidemiology of Disasters (CRED) Clos Chappelle-aux-Champs, 30. 1200 Brussels, Belgium
- Epicentre, 8 rue Saint Sabin 75011 Paris, France
- Institute of Development Studies, University of Sussex, Brighton BN1 9RE, UK
- International Institute for Environment and Development, 3 Endsleigh Street, London WC1H 0DD, UK
- League of Red Cross and Red Crescent Societies, PO Box 372, CH 1211, Geneva 19, Switzerland
- Médecins sans Frontières, 8 Rue St Sabin, 75011 Paris, France
- Oxfam, 274 Banbury Road, Oxford OX2 7DZ, UK
- PAHO, 525 Twenty Third Street, N.W. Washington DC 20037, USA
- Save the Children, 17 Grove Lane, London, SE5 8RD, UK
- The Relief and Development Institute, 1 Ferdinand Place, London NW1 8EE, UK
- UNHCR, Palais des Nations, CH 1211 Geneva 10, Switzerland
- World Health Organization, Emergency Preparedness and Response, CH 1211 Geneva 27, Switzerland

DISASTER STRIKES!!

Test your knowledge and ability to react approximately

Comment on the following statements by ticking either True or False

1. In case of disaster, send out an immediate appeal for international medical personnel.
True ☐ False ☐
2. When a disaster occurs, people in other countries should not react by immediately organizing the collection and despatch of whatever can be obtained in the way of medicines, clothing, equipments, etc.
True ☐ False ☐
3. A few weeks after a disaster occurs, things are usually back to normal and most of the major services are restored.
True ☐ False ☐
4. Disasters cause fewer deaths in rich countries than in poor countries.
True ☐ False ☐
5. Disasters bring out the worst in human behaviour.
True ☐ False ☐
6. When disaster strikes, outbreaks of infectious diseases are inevitable due to the presence of unattended dead bodies.
True ☐ False ☐
7. Mass hunger can be avoided after a disaster strikes
True ☐ False ☐
8. Following a disaster, it is best to house people as close as possible to their own dwellings rather than in settlement camps
True ☐ False ☐
9. In case of limited food supplies following a disaster, priority should be given to the young and the old.
True ☐ False ☐
10. When disaster strikes, each individual should take care of his own family and belongings first.
True ☐ False ☐

11. The intensity of two recent earthquakes in Armenia and San Francisco was the same but in Armenia several thousand died whereas in San Francisco sixty people died. This is mainly due to the difference in earthquake-proof construction.

True

☐

False

☐

12. The Sahelian drought is caused by a combination of climatic and man-made factors.

True

☐

False

☐

INDIAN SOCIETY OF HEALTH ADMINISTRATORS (ISHA), BANGALORE

PROFORMA FOR PREPARATION OF DISTRICT HEALTH PROFILE

I. DEMOGRAPHIC

1. Area of District (in sqkm) :

2. Total Population :

3. (a) Females in age group 15-44 yrs :

(b) Females in age group 15-29 yrs :

(c) Children in age group 0-4 yrs :

4. Number of live births registered over last five years :-

Period	1983-84	1984-85	1985-86	1986-87	1987-88
a) Total Number					
b) Female					
c) Male					

5. Age-wise distribution of women registered at Antenatal clinics in the District (including sub-centres) during last one year

Age Group	No. Registered	Average no. of living children/ female (if available)
15		
15 - 19		
20 - 24		
25 - 34		
35 +		

II. MORBIDITY AND MORTALITY

MORBIDITY :

Total new out-patient attendance at all Government health facilities past one year

Period :

Out-patient at

District Hospital:

Number :

2. Out-patient statistics as per WHO classification of diseases in above period.

	<u>Number</u>	<u>% of Total out-patient</u>
1. Infectious & parasitic		
2. Central Nervous System		
3. Respiratory		
4. Metabolic and Endocrine		
5. Neoplasms		
6. Blood and Circulatory		
7. Deficiency Diseases		
8. Gastro-intestinal system		
9. Uro-genital system		
10. Accident, Trauma, fire etc.		

3. Total number of reported/registered cases of the notifiable diseases in past one year.

1. Tetanus-neonatal; post-operative and others :	
2. Rabies :	
3. Malaria - P.F. P.V. :	
4. Filaria :	
5. Tuberculosis :	
6. Cholera/Gastro Enteritis :	
7. Paralytic Poliomyelitis :	

4. Number of Gastro-intestinal disorder

reported	1984	85	86
----------	------	----	----

Number of safe drinking water supply points available in District (Deep tube-wells supply)

- . 3 .
5. Number of cases of diseases pendemic to the area
(eg. filariasis, yaws, kalaazar etc.)

MORTALITY

1. Total number of deaths registered in last one year:

<u>No.</u>	<u>% of registered</u> <u>births</u>
------------	---

2. a) Total infant deaths registered
b) Infant deaths due to Tetanus
c) Total female infant deaths
d) Total male infant deaths
3. Number of maternal*deaths reported in the past year:
(*Pregnant or post partum within 42 days)

III. HEALTH RESOURCES AND DELIVERY OF HEALTH SERVICES IN GOVERNMENT SECTOR

1. GENERAL:

- a) Total number of Govt. Health institutions in the District:
- b) Allopathic facility available at _____
- c) Ayurvedic facility availbale at _____
- d) Homeopathia facility available at _____

2. BED STRENGTH

- a) Total number of beds at District Hospital :
- Medical beds _____
- Surgical Beds _____
- Othalmic Beds _____
- Obstetric-Gynaec _____
- b) i) No. of Taluq level hospitals/community health centres _____
- ii) Total No. of beds available at all of b(i) _____

- c) i) No. of Primary Health Centres : _____
ii) No. of beds available at PHCs : _____

- d) i) Other health facilities :

ii) Total No. of beds available at these health facilities :

3. PROVISION OF DOCTORS :

- a) Total no. of posts of Govt. Doctors in District: _____
b) No. of posts of Allopathic Doctors : _____
c) No. of posts of allopathic doctors at Dist. Hospital: _____
d) No. of posts of allopathic doctors at Taluq hospitals/ community health centres : _____
e) No. of posts at PHC Levels, PHUs, Dispensaries: _____

4. Availability of Doctors :

- a) Doctor : Population ratio as per sanctioned number of posts : _____
b) Doctor : Population ratio as per existing post occupancy : _____
c) No. of doctor: months services provided for (No. of posts X 12) : _____
d) No. of doctor: months services rendered*

*Subtract from IV(c) the following

- i) No. of posts lying vacant throughout the year X 12
ii) Posts lying vacant for varying periods (in months) -
Add the number of months for which each post in the district has been vacant on account of
a) leave more than one month
b) doctor posted, not joined
c) doctor joined but proceeded on leave
d) doctor not posted

. 5 .

5. Remarks of DHO on Section III & IV

6. Availability of preventive services

a) Average population covered by each PHC in the District :

Range :

b) Average population covered by Male health worker in the District (as sanctioned) :

c) Average population covered by female health worker in the District (as sanctioned) :

d) No. of male health workers posts lying vacant: _____

e) No. of female health worker posts lying vacant: _____

7. Achievements under National Programmes:

a) Malaria

b) Tuberculosis

c) Family Planning

d) Blindness

e) Leprosy

f) Immunization

8. a) No. of Govt. health facilities with microscopy facility (only places where post of microscopist is sanctioned and microscope available to be considered):

b) No. of Government Hospitals with X-ray facility:

IV. GENERAL

1. TOPOGRAPHY :

a) Nature of Terrain and accessibility :

- i) Difficult roads
- ii) Hilly
- iii) Plains
- iv) Sparsely inhabited desert
- v) Forested with tribal population

b) Climate :

- i) Snowy in certain seasons and therefore difficult
- ii) Profuse rainfall/flooding seasonally

c) Occupation of people:

- i) % of persons with occupation
- ii) % of population in industry
- iii) Any particular industry(eg. coal sericulture, beedi workers etc.)
- iv) How many in these industry/industries mentioned in (iii)

d) Religion-wise distribution of population :

- i) Hindus
- ii) Muslims
- iii) Sikhs
- iv) Christians
- v) Others

e) Quality of Land:

- i) % of forested land
- ii) % of land irrigated
- iii) % of land with rainfed agriculture

